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PIONEER IN SEMICONDUCTORS

ARTHUR E. MIDDLETON

Semiconductors were known and used before World War I. But like the radio fans who tinkered with galena crystals in the early days of radio, scientists used semiconductors without knowing how they worked. It was not until the quantum mechanical theory of solids was developed, between 1928 and 1934, that scientists gained insight into electrical conduction in semiconductors.

Semiconductors, as the term, of course, indicates, are materials that have electrical resistivities between those of insulators and good metallic conductors. They also have special electrical, optical, and other properties not common to metals. Because of these properties semiconductors have many uses. They are employed for electrical detection, rectification, amplification, conversion, recording, and other purposes.

A real knowledge of how semiconductors work had to wait for World War II. During the war years, a group of scientists at Purdue University began a careful study of the semiconductor germanium for use in radar. Their work provided new knowledge that is serving as a key to the understanding of many of the semiconductors.

Battelle's Arthur E. Middleton was a member of the Purdue research group. While there he was closely associated with studies of the effects of varying amounts and types of alloying materials and temperature changes upon the electrical behavior of germanium. This work, which formed the basis of Art's doctoral dissertation, gave the first concrete evidence that the special conduction properties of semiconductors were dependent upon the impurities in, or the imperfections in, the crystals of the materials. When the Purdue research was done, scientists had access to knowledge that made controlled semiconductors possible.

Art joined the Battelle staff in 1945, where he now has his own team of specialists in semiconductors and dielectrics. In 1950, he was one of twelve Americans to attend the international semiconductor conferences at Reading, England.

Recently, for the second consecutive year, Art and the members of his Semiconductor and Dielectrics Division completed an important aid to workers in semiconductors. They have prepared the "Digest of Literature on Semiconductors for 1951" for inclusion in the *Digest of Literature on Dielectrics*. Since its organization, the same group has contributed much to a better understanding of the special properties of semiconductors and to ways of making effective use of those special properties. Included among their more recent contributions are a high-temperature deposited carbon-film resistor and a new high-temperature titanium dioxide rectifier for the Air Force for use in aircraft.

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Research and Economic Change

People closely associated with industrial management and finance are becoming increasingly aware of a change that has taken place in our industrial economy in the past ten years. Our economy has gradually shifted from one based primarily upon finance, high-speed production, and use of natural resources to one dependent upon technology.

This change is for the good of industry and for the strengthening of free enterprise. It does not lessen the roles of finance, good management, mass production, advertising, or selling, but accentuates their positive features for service. In all probability, this change is the "shot-in-the-arm" industry was seeking in the 1930's to get out of its doldrums. Quite likely, it will help prevent or, at least, ameliorate future business depression.

A combination of factors has brought about this change in the sustaining basis of the industrial economy. There has been developing in this country an effective system of applied scientific research. This system of research reached a high stage of development during World War II, and since the end of the war has been perfected even further in solving problems of civilian production. Management and labor have learned to apply the results of research industrially, and both now accept and use the tools of science. The public has become sold upon research and now expects, and even demands, that the products industry offers be based upon principles established through laboratory investigation. The time lag between scientific development and commercial use has decreased to such an extent that now a commercial product may be on the market a year or two from the time of original conception.

Vast industrial and military expenditures for research, made during World War II and in more recent years, have been a major factor in bringing about this change in the basis of our economy. Military research has stimulated private industrial research and resulted in new peacetime products. Notable successes achieved in the application of research have permanently wiped away doubts as to its effectiveness in solving industrial problems.

Also, research has made industry more competitive, and, in turn, research has become necessary to meet competition. Only by constant effort to improve and create new products can a company hope to maintain its competitive position.

Another factor contributing to the present role of research in the economy is the increasing proportion of industry based solely upon technology. Every year we see new industries arise as a direct result of technology. The titanium industry, now developing, is one example. Year by year the proportion of "science-created" industries increases and the proportion of industries based on "art" decreases.

With the increased proportion of industries based upon technology, has come an increased percentage of technical men in management. Men trained in engineering, science, and research methods now serve on boards of directors and hold top management positions. These men think in terms of research and technology.

Still another factor responsible for the present emphasis on research is the raw materials problem of industry. Raw materials, once plentiful in America, are no longer so readily found in easy-to-use forms. Research enables industry to conserve and utilize existing supplies of raw materials more efficiently and to upgrade materials formerly considered unworthy of development. Research has become the major source of materials needed by industry, and, thus, in itself, is the nation's greatest resource.

Whatever the future may bring, our economy is in better position to serve the country's needs because of the change to research and technology in its supporting foundations.

Clyde Williams

Director, Battelle Memorial Institute

Mathematics in Industry

by J. CLARENCE BELL

The author's specialization is the application of mathematics to research and industrial problems. He has done much work in the fields of heat flow, stress analysis, and ballistics. He was instrumental in the establishment of the computing laboratory at Battelle and programs work for that laboratory. Before his association with Battelle in 1944, he received his Ph.D. in mathematics at the University of Illinois and taught at the same institution.

ABOUT 4000 years ago, in Babylon, a scribe with a stylus recorded a lesson on a clay tablet. He showed the reader how to find the number of years in which the interest at 20 per cent on one mina, compounded at the end of each five years, will amount to 64 minas.[1] When we see his rate of interest, we need not marvel that Moses, centuries later, wrote, "Unto a stranger thou mayest lend upon usury; but unto thy brother thou shalt not lend upon usury".[2]

Disregarding the morality of the ancients, there is something else here for us. This is one of the earliest known records of algebra, and it treats a practical matter. In every age it has been so—mathematics has always served practical purposes.

Perhaps the best-known achievement of applied mathematics came more centuries later when Newton derived his celebrated law of gravitation. Whether or not a falling apple inspired him, such an event never could have justified the law. He used geometry and calculus—which he invented—to harmonize Kepler's astronomical observations and so confirm the law.

Nowadays, mathematics is a jungle of weird words and symbols. If we seek to read it, we are confronted by such terms as hodograph planes, function spaces, ergodic theory, and the minimax. Yet all of these names refer to ideas that are serving practical uses. For example, the hodograph plane—with its points representing the size and rate of change of a velocity—is a useful tool of modern aerodynamics.

In view of the strange phrases and recognizing that much of what is really other sciences is couched in mathematical terms, the reader may well ask

What Is Mathematics?

I remember one day when a colleague came to ask me a question on mathematics. He showed me a lengthy article on thermodynamics about which I knew almost nothing. Buried in the middle were a couple of equations. To him, that spelled mathematics, but to me it spelled only thermodynamics. His definition was too broad.

Other people have viewpoints that are too narrow. A mathematician who joins a social group does so at the risk of being made the treasurer. His friends want him to use his talents. Their vision is limited by the bounds of their own experience.

From a practical point of view, mathematics is a factory and storehouse for facts about relationships between things. It helps the financier compare the values of many kinds of investments. It shows how bits of matter, pushing and pulling each other, combine forces to support a load on a beam. It tells how the period of a pendulum is related to its length. It does not tell us the true nature of things, but it shows how supposed simple attributes must affect complex situations.

In a deep sense, mathematics is pure abstraction. A. N. Whitehead said, "Mathematics is thought moving in the sphere of complete abstraction from any particular instance of what it is talking about."[3] It is hard to outline its realm of abstraction, except to say that it is the one laid out by mathematicians. The realm does not consist of thermodynamics nor of finance, but of axioms, theorems, and concepts.

In order to show how mathematics is useful in industry today, and at the same time partly to outline the scope of the subject, I wish to discuss a few of its applications. The list is far from exhaustive. Since most readers of this article will have studied some mathematics in college, let us begin there.

Applications of Familiar Mathematics

A person who buys his home with the aid of a mortgage often receives an itemized payment schedule. The schedule shows how much of each payment will go for interest and how much for principal. The amounts change monthly. These amounts are computed from interest tables based on simple algebraic formulas given in many college algebra courses. It helps the borrower in making and paying his loan if he understands the basis of the transaction.

Technology often demands that some simple formula shall be evaluated often. The arithmetic is simple,

but it is a nuisance to do it so often. At such times, a nomograph may help. A few lines are drawn with carefully marked scales. Then anybody can compute the formula easily by merely laying a ruler down two or three times on the paper. Nomographs have often been prepared on such diverse topics as roll flattening in rolling mills and the relation between atomic per cent and weight per cent in a two-element system. All that is needed in planning most nomographs is a little analytical geometry and a readable book of examples.

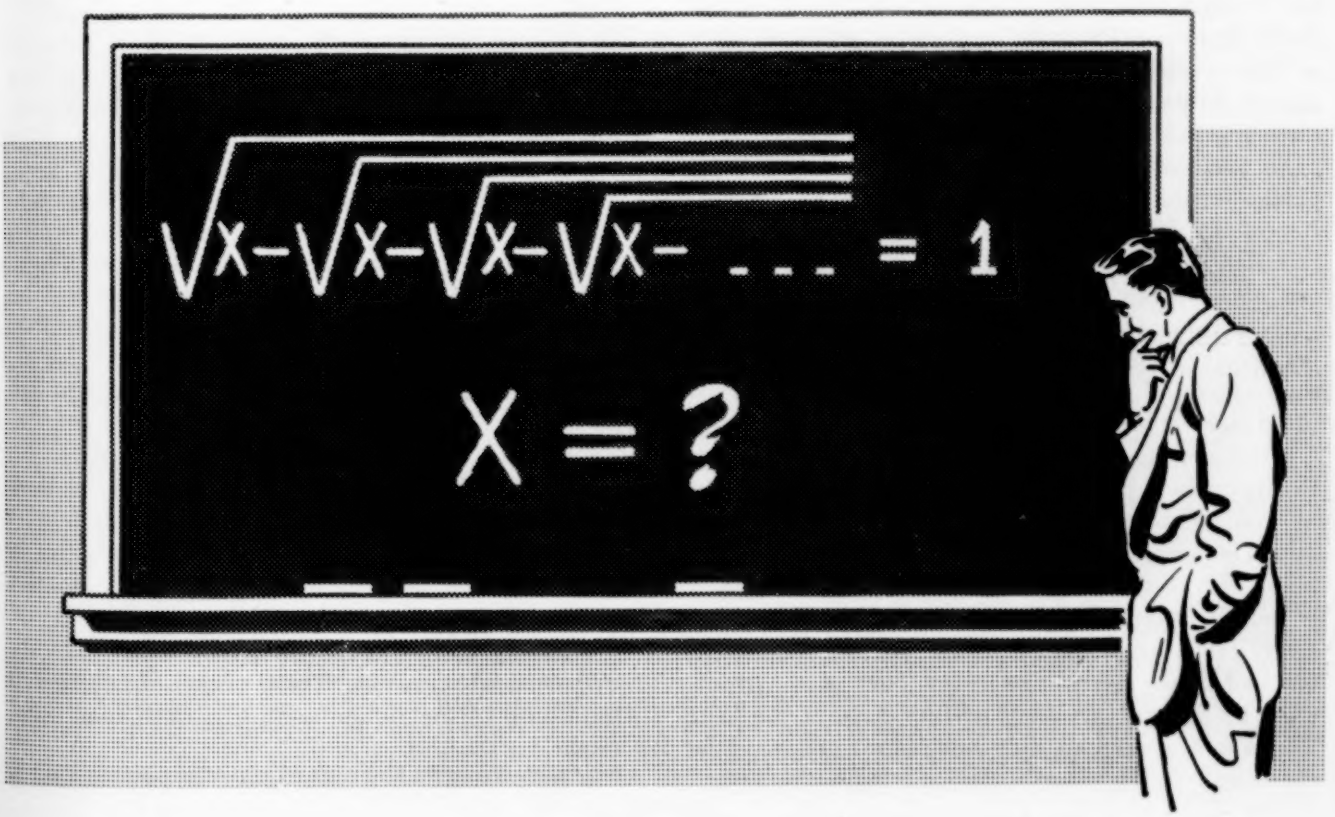
In one case, a press was being designed to extrude tubes like those used for toothpaste. In order to get the right dimensions for the links, it was necessary to compute how the piston moved, using analytic geometry. The formulas were simple enough, but they defied computation. At several places, one large square root had to be subtracted from another, and the differences were so small that the required accuracy was lost. Then a mathematician expanded the roots as infinite series and found the difference algebraically. Thereafter, the arithmetic was easy. This sort of difficulty arises often, so the man who learns to subtract series rather than numbers often avoids trouble.

Heat Conduction

Mathematics is often used in problems of heat conduction. For example, it was known that metals can be machined more easily when they are hot. Since it is expensive and awkward to heat an entire workpiece, it was suggested that it might be profitable to use only local heating.[4] Little metal would be heated except that about to be cut away. The idea was to apply a strong heat flux for a short time, and then to let the heat soak in for another short time. The mathematical problem was to find a flux, heating time, and soaking time which would put the necessary heat into the chips and little excess heat anywhere.

The solution for this problem must satisfy the partial differential equation of heat conduction. It must also meet certain "boundary conditions" that tell the rate of heat input and the initial temperature. The solution turns out to be a sum of exponential and error functions. The figure on the next page provides an example of what it shows if a steel bar is to be heated 900 degrees F. on its surface and 675 degrees F. at a depth of 0.10 inch. The "efficiency" is the fraction of the applied heat cut off in the chips. With this kind of information, engineers could see what input rates and heating and soaking times were desirable.

The mathematical theory of heat conduction has found many other uses at Battelle. It has interpreted measurements of thermal conductivity and temperature. It has predicted many thermoelastic stresses. It has aided in combustion studies. The problems are rarely new in their general form, but they are often new in important details. This is because problems involving partial differential equations and miscellaneous boundary conditions are individual. A slight change in



the boundary conditions may shake the whole structure of the solution.

Aerodynamics and Stress Analysis

In a large measure, the modern airplane is a tribute to the success of mathematics in two of its most important applied fields: aerodynamics and stress analysis. Stress analysis is vital in making an airplane light and strong enough to fly. Aerodynamics is vital in designing wing shapes and power units needed to keep the airplane in the air.

In 1902, a year before the great day at Kittyhawk, a German, W. Kutta, derived a formula for the lift on an airfoil. Being generalized by use of conformal mapping, this Kutta-Joukowsky formula became important a few years later in design of airplane wings. While it may not have helped the Wright brothers, this formula did guide many later engineers in choosing airfoil shapes and in correlating experimental data.

An airplane requires air to lift it, but the same air drags on the plane to slow it down. Therefore, many mathematical studies have been made on the boundary layer of air near the plane's surfaces. The theory ties experimental results together so they can be understood, and often points the way to reducing friction and producing more stable flow.

Experimenting with airplanes has become costly and dangerous, especially with supersonic planes. The theory of wing performance has become complicated too, because high speeds make air compressibility and shock important. Jet power has created problems, such as how nozzles should be shaped. Studies of new designs—airframe or engine—have become increasingly mathematical, and formulas multiply endlessly.

To measure the importance of theoretical aerodynamics for the airplane, consider the NACA Technical Reports for 1950. There were 52 reports, of which 25 primarily concerned theoretical aerodynamics. For sweptback wings, they treat lift, damping in roll, stability, and low speed loafing. They deal with operating performance for turbojet engines. They add light to the meaning of wind tunnel data and help us understand many other topics.

Stress analysis is also very important for the airplane. Engineers long built safety into buildings and bridges by making them 5 to 10 times stronger than necessary. This means that structural parts are made several times heavier than they need to be. Such prodigality in weight would keep an airplane grounded. The safety factor commonly used for aircraft is one and one-half. This means that every part of the frame must be designed to carry its full share of the load. The skin must carry its share and not merely round out the shape. Stiffeners are added only where necessary.

Because plates in compression support much of the load, buckling is an important problem. Understanding buckling requires a sound mathematical foundation. Flutter is apt to cause a structural failure, so possible vibrations must be calculated before the plane is flown. In addition, much stress analysis goes into the design of inner parts, such as the engine.

Mathematical problems in aerodynamics and stress analysis often look much alike. There are several simultaneous partial differential equations together with a variety of boundary conditions. Little exists in the way of general solutions. The investigator must often use great ingenuity to make a problem solvable, and he must be prepared for defeat. Even the reader of such work must toil to comprehend it.

Of course, both fluid mechanics and stress analysis have many other uses, too numerous to mention here.

High-Speed Computing

In recent years, there has been much excitement about the new high-speed computing machines. We read about "machines that think", and we are not surprised to read of one that plays chess. Actually, these machines do little but grade-school arithmetic, but they do it at fantastic speeds.

The reason why many scientific organizations, including Battelle, are using these high-speed machines is that they can beat down many arithmetical barriers. They do it by sheer mechanical efficiency. For example, the new ORDVAC at Aberdeen can multiply by ten-digit numbers about 1000 times in one second.[8] While the machine is doing this, it is not troubled by financial or domestic problems nor distracted by conversations. Thus it is far faster and more accurate than a human computer could be.

The reader probably recalls the ease with which he learned to solve two simultaneous linear equations. They came as a welcome relief in an otherwise tedious algebra course. Three equations were a little harder, but determinants helped some in solving them. Four equations—once was enough! Five or more equations were unthinkable, for the work increases rapidly with the order.

Simultaneous linear equations appear in many practical guises. Five to ten complex equations, or twice as many real equations, appear often in flutter analysis for aircraft and in electric circuit analysis. The writer had one hard experience with 44 equations in a stress analysis for an aneroid capsule.[9] Fortunately this system had a special form which made solution by hand barely possible. These systems do not respect the desire of the computer to stop with three equations.

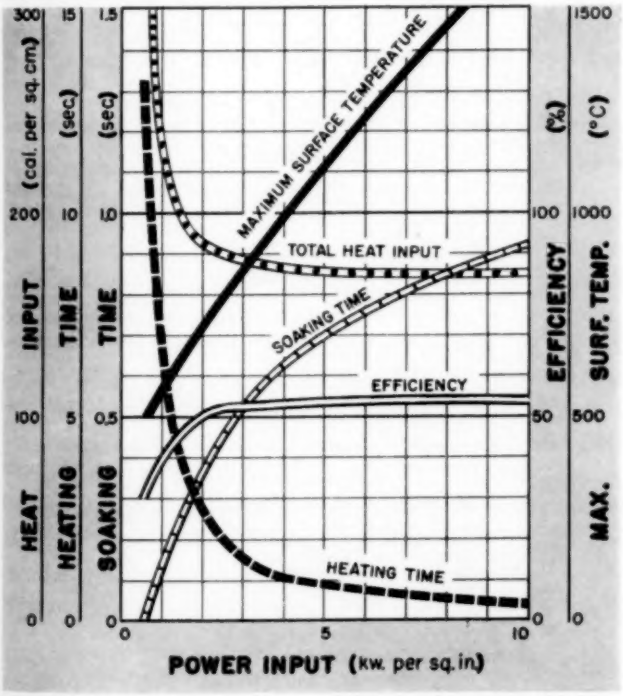
High-powered computing machines now handle so-

lutions of this size with comparative ease. For example, the commercially available IBM Card-Programmed Electronic Calculator can invert a 20x20 matrix in two hours.[7] This result is even broader than a straight solution of 20 equations. The ORDVAC and several other large machines would do the same task in a few minutes.

These machines do not supersede mathematicians. Men must invent the problems. Men must break the problems into arithmetical steps suitable for the machines. Men must also solve new theoretical problems which large computations entail. For example, several new methods for solving linear equations have been evolved which barely resemble those we learned in college. New methods are appearing for solving ordinary and partial differential equations. Much is being done with random numbers. Altogether, this means more and more work for mathematicians.

Monte Carlo Calculations

One of the important problems in controlling atomic fission is predicting the diffusion of neutrons through various kinds of solids. Formulas are very cumbersome. To meet the problem, S. M. Ulam[8] of the Los Alamos Scientific Laboratory suggested that it would



The graph shows the computed effect of varying power input in a hot-machining operation. At a specified power input, the heating and soaking times must be chosen as shown here in order to get the assigned surface and interior temperatures at the instant of machining. The efficiency in using the heat increases with the power input, but not much beyond 54 per cent. The maximum surface temperature during the operation increases greatly with increased power input.

be easy to construct a pseudo history of a neutron. Each collision might affect it differently, but each time the effect could be chosen at random from all possible effects. By constructing many of these artificial histories, it would be possible to find how a whole shower of neutrons would behave. The method is very well adapted for high-speed computing machines that can do repetitive calculations almost endlessly.

This method of solving problems has much in common with professional gambling. Events occur at random, but their relative frequency is fixed so that the operator finally wins. For this reason, the method is widely known as the Monte Carlo method.

The work at Los Alamos was the beginning of a large tide of work with random numbers.[9] Much of it concerns diffusion problems in the control of atomic energy. We hope this work will soon be important in peacetime industry. Several other calculations have been made to simulate events on a battlefield, so as to test new equipment or tactics without resort to bloodshed.

At first glance it appears that Monte Carlo calculations are a way to avoid mathematics, and in a measure this is true. However, present thinking has gone far beyond avoiding complicated formulas by doing obvious sampling. It is recognized that many formidable equations and formulas can be regarded as limits of tricky sampling processes. These include many ordinary and partial differential equations, complicated integrals, Green's functions, eigenfunctions for Schrodinger's equation, and so on. There is much exploration in store to find the breadth of this field. In addition, there are many logical pitfalls in replacing continuous functions by discrete samples, and someone must cover them well.

Statistics

Mathematical statistics has been used so widely that its ideas are commonplace to most scientists. However, it may not be amiss to tell a few ways in which it is affecting industry.

Automatic packaging is a great time saver in packing cereals, canned goods, and other items sold by weight. As a rule, the packaging machines do accurate work, but there is always a little variation. Of course, sometimes the machines get out of adjustment, and then they make many errors. It is desirable to have a way for checking packaging machines so that they can be adjusted whenever errors become too frequent or too large. Battelle recently developed a machine to do just that.[10] It makes simple, continuous, statistical tests to decide whether the packaging machine needs adjustment. Its decisions are based on the weight distribution of the last several packages that have been filled.

Sometimes statistical tests are both necessary and

destructive. For example, this is true of acceptance tests for artillery shell. Then it is desirable to make only the smallest number of tests that will give a conclusive result. Of course, that number usually depends on the trend that forthcoming tests will take. To meet this need, sequential analysis has been introduced.[11] The plan is to set up standards for conclusive results and then to find how each new test affects the cumulative results. When a standard is reached, the tests stop.

Ideas of this kind are extended in Wald's theory of statistical decision functions.[12] This theory is intended to guide the user in choosing a course of action. The course could be a statistical testing program to be selected in ignorance of how the tests will go. The theory leans heavily on mathematical probability and even topology. If it were simpler, I should be glad to recommend it to those who, like myself, have difficulty in making decisions.

These few ideas are but samples of what statistics is doing.

Communication Theory

A novel use for mathematics is in communication theory. C. E. Shannon of the Bell Telephone Laboratories has devised much of the theory in efforts to improve his company's services.[13] Norbert Wiener of M. I. T. also has contributed much through his studies of filtering.[14]

Shannon's mathematical theory abstracts communication systems in much the same way, whether they be telegraph, telephone, television, or merely a conversation with a nearby person. All parts of the system are treated, including the information source, the message, the transmitter, the signal, a noise source, the receiver, and the destination. The theory is intended to measure the information in the message, to measure the transmission capacity of the system, to balance the components of the system, and to make the transmitted message carry a faithful meaning.

For example, consider the amount of information in a typical English word or sentence. When one has seen "informat . . .", he surmises the last three letters should be "ion". Those letters are largely redundant. Likewise, if "are" had been lost from the preceding sentence, the reader could have filled it in anyway. The Russians normally would omit it. One may conclude that English is about half redundant.

Similar ideas apply to television. If one small square is black, one next to it is apt to be black too. Some people estimate that reducing the redundance in the signal might make it possible to reduce the band width by a factor of ten or more. If circuits could be devised to do this, there could be many more stations. Other people are working both theoretically and experimentally with new devices for coding signals. For example, one scheme is pulse-code modulation, which may offer a good way to improve the quality of the picture.[15]

Communication theory seeks many ways to improve our standard forms of communication. Then it branches out into such surprising fields as devices to aid the blind, analysis of brain waves ,and group organization of people.[16] It is hard to predict what all may be learned at last from this theory.

Conclusion and Acknowledgments

There are many other fruitful ways to apply mathematics in industry. Many of them, such as electromagnetic field theory, are just as important as many discussed here. Meanwhile, I trust the reader has found ample reason to believe that mathematics in industry is living, growing, and useful.

Several of my colleagues have been very helpful in suggesting subject matter and in criticizing this text. They are E. M. Baroody, G. H. Beatty, Jack Belzer, M. N. Chase, and R. J. Harrison.

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Looking Ahead With Conventional Fuels

by DAVID D. MOORE

After studying chemical engineering at the University of Missouri, the author worked as an engineer for oil companies in the southwest oilfields and was a major in the U. S. Corps of Engineers during World War II. He joined Battelle in 1948 where his work has been in the field of engineering economics, particularly in the evaluation of mineral resources and in the making of industrial marketing surveys.

WHILE we hear much about the early commercial application of atomic energy, its general use lies well into the future, and is correctly considered to be a long-range development. The conventional fuels—coal, petroleum, and natural gas—will be used for years to come, either directly or transformed into electricity, for heating homes and powering factories. Improvements in the use of present fuels, as well as the development of new fuel compounds, constitute the changes to be expected in the immediate future.

Because coal is the most plentiful of the conventional energy resources in the United States, it should become an increasingly important target for research. At present, major research efforts are directed toward two principal fields. On the one hand, the development of new methods of mechanical mining and loading is aimed at lowering production costs. On the other, research on improved methods of using coal is aimed at developing new or enlarged markets.

Increasing electrification provides one promising opportunity for the expansion of coal markets. Use of coal jumped to more than 105 million tons in 1951, a three-fold increase over 1938. In the East North-Central states electricity can be considered as an upgraded form of coal energy. While coal was used to produce almost 25 per cent of the total electric power generated in the United States, it supplied more than 90 per cent of the electricity used in that one section. In the form of electrical energy, coal has maximum flexibility and utility. Continued expansion of the use of electrical appliances and the development of new devices will call for even more electrical energy. Among these new devices are the heat pump and the dehumidifier, as well as new electric furnaces for steel and other metallurgical applications.

In the field of proposed new equipment to utilize coal, the gas turbine now figures prominently. Immediate interest in this turbine is in the field of railroad motive power, where the long-time supremacy of the coal-fired steam locomotive has given way to the diesel engine. How to produce hot gas from coal for the turbine, without encountering difficulties from ash, is a problem now being attacked energetically by research.

Increased Use of Natural Gas

During the past few years nationwide utilization of natural gas has skyrocketed. Research and development of techniques for long-distance transmission of the gas has been a major factor in this expansion. Even so, available supplies of natural gas continue to grow through improved discovery and development methods. Research is quite active in fields such as exploration and recovery, transmission and storage, and conversion to various chemicals.

The use of natural gas in stationary power plants is becoming widespread. Both reciprocating engines and gas turbines are used. In Oklahoma, Arkansas, and Texas, such engines and turbines are setting records for low-cost operation, and their adaptation to use producer gas (made from coal) is of great current interest. This in turn has encouraged research to develop an improved gas-from-coal producer.

Petroleum Research

Research expenditures by the petroleum industry are running at more than $100 million annually—far more than the combined total of other branches in the fuel field. While basic interests are concentrated on where and how to find petroleum, how to get it above ground, and how to refine it most effectively and economically, research extends to separation or conversion of petroleum fractions to lubricants, to new and lower cost organic chemicals, to synthetic rubbers, plastics, and to numerous other specialty fields.

Petroleum and automotive research has led to vast improvements in the power and efficiencies of the spark-ignition engine. Future developments will determine the best compromise between higher chemical octane numbers (fuel composition) and higher mechanical octane numbers (modified engine design).

The trend towards jet aircraft will reduce the need for high octane fuels, but increasing quantities of such fuels will be required so long as reciprocating engines power transports and long-range aircraft.

The diesel engine has become a major prime mover in stationary plants as well as in locomotives, trucks, and buses. This trend may be expected to continue, as refinements in design and better performance increase the economic advantage of the diesel engine over other types.

The development of a chemical industry based on petroleum fractions has been phenomenal. As a better knowledge of the composition of petroleum is gathered, new techniques will be found to separate or synthesize a myriad of new products in vast quantities.

Synthetic Liquid Fuels

Through an extended period of research and development, industry and government have found suitable means to make synthetic liquid fuels, though at higher costs than the natural fuels, when the need arises. Coal reserves are sufficient to supply such needs for hundreds of years. In addition, oil shale reserves in the Western United States and tar sand deposits in Canada are enormous.

The Federal Government, through the Bureau of Mines, has had a large continuing synthetic liquid-fuels program for several years. Two processes using coal are in pilot-plant operation at the Bureau's experimental station at Louisiana, Missouri. One, hydrogenation, involves the direct conversion to liquid fuels through addition of hydrogen to pulverized coal under high pressure and temperature conditions. The other, the Fischer-Tropsch Process, produces liquid hydrocarbons through the catalyzed reaction of carbon monoxide and hydrogen made from coal. At Rifle, Colorado, the Bureau has a demonstration mine and pilot plant to convert oil-shale to shale oil and low-grade liquid fuels.

Industry has also been a major contributor to synthetic liquid-fuel know-how. In fact, a plant based on the Fischer-Tropsch Process using natural gas as the raw material is in commercial operation at Brownsville, Texas. Major oil companies and others have conducted research on hydrogenation and oil shale conversion for many years. Coal and chemical companies are also working on improved methods of conversions to synthetic fuels and chemicals from coal and natural gas. Quite recently a coal-hydrogenation plant for chemicals started operations at Institute, West Virginia.

Should the cost of producing petroleum in the desired quantities increase to the point where it is profitable to produce large quantities of synthetic liquid fuels from coal, oil shale, or other raw materials, industry is ready to assume the task. This may come in twenty years; it could come sooner.

All in all, the fuels picture for the future is bright. Vast new resources of petroleum and natural gas remain to be discovered. In addition, the enormous coal reserves, and the lesser but important quantities of oil shale, insure this country a plentiful supply of gas and liquid fuel for generations to come.

Atomic energy and other new power sources may some day revolutionize the picture, and intensive research in these areas will continue. At the same time, efforts to improve existing methods of heat and power generation will enhance the value of the traditional fuels.

A scientific discovery depends on The Man, The Method, and The Moment. And, we should add . . ., The Means.

We might have had aviation in the Fifteenth Century. Leonardo da Vinci had the right aerodynamic ideas and even produced model helicopters, but he had no way of producing sustained propulsion; that had to wait for the development of the internal-combustion engine in the late Nineteenth Century.

RITCHIE CALDER, *Profile of Science*

Notes From Battelle

CHECKWEIGHING FOR FAST PACKAGING

Packagers of many products are using increasingly higher speed packaging apparatus. For example, machines are now available that will fill up to 400 packages per minute. But speed brings problems of its own. Experience has shown that the over-all variation in weights tends to increase as the speed of the filling machine is increased.

Usually, the faster the packaging operation, the lower the per unit cost of packaging. Speed is so important that packagers often find it more economical to accept losses from overfill than to slow down production. However, there is a limit above which the overfill must not go—a limit that must be controlled by checkweighing.

R. L. Merrill states, "Research at Battelle has demonstrated to us that automatic checkweighing will be imperative on high-speed packaging lines. Improved methods for processing large quantities of weight data are needed so that packaging line operators can make necessary control decisions. Automatic statistical quality-control systems combine the advantages of the automatic checkweigher with the efficiencies of statistical quality control. These systems, however, must be further developed to reduce their cost and to simplify their operation."

GALLIUM IN NUCLEAR REACTORS

The unusual operating conditions of nuclear power reactors call for the use of unusual coolants. The qualities desired in coolants are a low cross section for absorbing neutrons, good heat-transfer efficiency, a low melting point, and a high boiling point.

The element gallium has some of the desired properties—a melting point of only 30°C., a high boiling point of about 2000°C., and good heat-transfer characteristics. For these reasons, the Bureau of Ships, U. S. N., asked Battelle to determine the effect of alloying on melting and on cross section and to study the corrosion of possible container materials by the element gallium.

The resulting research discourages the use of gallium as a practical coolant for nuclear power reactors. Alloys were found that halved the melting point of gallium and at the same time effected a significantly lower cross section. However, the corrosion problem could not be overcome at temperatures where gallium's advantages relative to other nuclear reactor coolants would be realized. The corrosion of possible container materials by gallium was found to be generally high. Of metallic materials, only tungsten appears to resist attack completely. But since tungsten itself is exceedingly difficult to fabricate and has a high absorption cross section, its deficiencies seem to rule out the possibility of using gallium. Nonmetallic materials might be useable for corrosion resistance, but they possess serious handicaps in the matter of heat transfer and radiation.

The report of the research on this problem may be found in *Gallium in Nuclear Reactors: Considerations for Use as a Primary Coolant*, by R. I. Jaffee, R. M. Evans, E. A. Fromm, and B. W. Gonser. AECD-3317, Office of Technical Services, Department of Commerce, Washington 25, D. C. Price 20¢.

BUILT-IN HEALTH PROTECTION

Investigations at Battelle have shown the possibility of controlling disease-causing fungi in concrete by the addition of fungi-destroying materials. Research has shown that concrete containing 10 per cent copper acetoarsenite is effective in preventing the growth of "epidermophyton interdigitale", a mold known to be among the causes of athlete's foot.

Biologist Radcliffe F. Robinson reports that the effective life of the copper compound in showers or around pools where it is subject to leaching by large quantities of water is not fully known. However, leaching tests indicate that the compound should remain fungicidal for up to three years or perhaps longer.

Other possible uses for concrete treated with the fungicide are in industrial kitchens and slaughter houses and in ducts for carrying sea water where barnacles and other marine-fouling organisms may be found.

VISUAL STUDY OF GATING DESIGN

What kind of gating design will give foundrymen the best casting quality? The Research Committee of the Aluminum and Magnesium Division of the American Foundrymen's Society has sponsored research on this problem at Battelle. Previously, studies were made with molten metal as the liquid and sand as the molding material. Now a method has been developed which allows visual demonstrations of the mechanics of flow. This has been made possible by the use of transparent molds with water as the flowing liquid. Moreover, the

operation of the designs may be recorded by high-speed photography.

Certain recommended procedures have emerged from the new study technique. It was learned that each part of the gating system has to be designed so as to eliminate aspiration of air into the liquid and to minimize turbulence. Aspiration causes the formation of air bubbles and if present during the pouring of aluminum or magnesium, promotes dross formation.

The results of this type of research have been proved practical in the shop. The principles have been adopted by several foundries. One large gray iron foundry is reported to have reduced the amount of scrap substantially by incorporating some of the principles in its gating design. The same principles have permitted certain aluminum foundries to make noteworthy improvements in their casting quality.

ATOM-POWERED SUBMARINE

The recent ceremonies at Groton, Connecticut, in connection with the laying of the keel of the first atomic-powered submarine, marked a real milestone in atomic development. It was public recognition of the fact that a method had been derived for using atomic energy to propel a ship.

In the same connection, it became possible for the first time to reveal that Battelle has played a pioneering part in the development of the materials for the reactor that will propel the revolutionary submarine. Research on the materials for the reactor began at Battelle more than two years ago and involved from 50 to 60 of the Institute's staff members. At the invitation of the Government, Drs. Howard W. Russell and Russell W. Dayton, of Battelle, attended the special ceremonies at Groton.

BETTER MOLYBDENUM ALLOYS

The increasing need for structural materials with adequate strength for high temperature (above 1600°F.) use is making molybdenum an even more important metal than it has been in the past. Now efforts are being made to improve its strength properties by the development of new molybdenum alloys.

Research at Battelle by William L. Bruckhart, Murdock H. LaChance, Charles M. Craighead, and Robert I. Jaffee has turned up important data. They have shown that the ability of small amounts of alloying addition to strengthen molybdenum is in this order for the six most effective additions—silicon, cobalt, iron, aluminum, chromium, and tungsten. Except for the molybdenum-aluminum alloys, the strengthening and hardening effects of these elements are in inverse relationship to their solubility in molybdenum. This order of potency has been shown to hold for Vickers hardness up to 800°C., which is below the recrystallization range.

However, for service, the merit of an alloy is measured by the excellence of its qualities, not by alloying economy alone. On this basis, tungsten, which may be alloyed in large concentrations, is the most effective alloying additive for molybdenum. The most effective alloying additions and their amounts are the following: 0.25 cobalt; 0.25 iron; 1.0 chromium; 20.0 tungsten; 0.25 silicon; and 1.0 aluminum. All of these alloys fabricate readily and have strengths above 110,000 psi and elongations above 10 per cent.

FUELS AND ENERGY SYMPOSIUM

Adequate sources of fuels and energy promise to be one of the major problems of the future. For this reason, great interest was shown in the symposium on the "Future of Fuels and Energy Sources" presented before the Division of Gas and Fuel Chemistry of the American Chemical Society by a group from Battelle. Their papers covered almost all the important energy sources. They presented a picture of what may happen in the next 25 years on the basis of present trends, existing technical knowledge, and new technical developments.

David D. Moore reported on petroleum; John F. Foster on natural gas; Carl J. Lyons and Harlan W. Nelson on coal; Harlan W. Nelson on coking coals; and Bertrand A. Landry and Russell W. Dayton on unconventional sources of energy such as wind power, sun power, and atomic energy.

TECHNOLOGISTS HONORED

Three members of the Battelle staff were recently initiated into the Ohio State University's chapter of The Society of Sigma Xi. William L. Bruckart and Samuel A. Gordon became chapter members, and Carl J. Lyons was elected as chapter associate. In fulfillment of the membership requirements Bill presented a thesis on "Development of Molybdenum-Base Alloys", while Sam reported on "Some Repeated Load Investigations on Aircraft Components."

John Sullivan was honored, on June 24, with an award of merit for service to the American Society for Testing Materials. John has served on the Society's committee C-8 on refractories since 1933, from 1936 to 1948 as chairman. He has also served as chairman of the subcommittee on specifications since 1946 and has been a member of the advisory board of committee C-8 since 1938.

RECENT PAPERS BY THE RESEARCH STAFF*

Radioactive Methods of Analysis. C. D. Calkins. *Ohio Journal of Science*, May, 1952.

Melting Aluminum-Base Alloys. L. W. Eastwood. *Canadian Metals*, May, 1952.

Gasification of Solid Fuels at Elevated Pressures. Wilhelm Gumz. *Industrial and Engineering Chemistry*, May, 1952.

Magnetic Core Materials. A. V. Hughes and C. F. Salt. *Electrical Manufacturing*, June, 1952.

Application of Nickel Compounds in Ceramics. C. G. Harman and B. W. King. *Industrial and Engineering Chemistry*, May, 1952.

Engineering Reports Are Vital to Good Management. J. B. Holding and J. D. Wallace. *Product Engineering*, May, 1952.

New Developments in Package Checkweighing. R. L. Merrill. *Improved Methods of Packaging Production and Materials Handling*, Packaging Series No. 38, American Management Association, 1952.

The Formation of Refractory Coating by Vapor-Deposition Processes. Carroll Powell and I. E. Campbell. *Journal of Chemical Education*, April 1952.

Solubility of Hydrogen, Oxygen, Nitrogen, and Helium in Water. H. A. Pray, C. E. Schweicker, and B. H. Minnich. *Industrial and Engineering Chemistry*, May, 1952.

New Processes for the Utilization of Low-Grade Ores. J. D. Sullivan. *Proceedings* of the United Nations Scientific Conference on Conservation and Utilization of Resources. Vol. II, Mineral Resources, 1951.

Conservation in Production of Iron and Steel. Clyde Williams. *Proceedings* of the United Nations Scientific Conference on Conservation and Utilization of Resources. Vol. II, Mineral Resources, 1951.

Can Improved Printing Be Produced With Present Newspaper Plant Facilities? J. Homer Winkler. *The Electrotypers and Stereotypers Bulletin*, May, 1952.

***In most cases reprints will be available upon request to the Editor of the* BATTELLE TECHNICAL REVIEW**

A Word About Battelle Technical Review Abstracts

The abstracts that appear in the following pages are prepared from approximately 900 American and foreign technical journals, as well as from books and other literature received in the Battelle Library. Prepared by a professional staff trained in various technological fields, the abstracts are selected for their usefulness to the Battelle research staff. They are now being made available to technologists and scientists in industry and research in all parts of the world, through the pages of the *Battelle Technical Review*.

BATTELLE TECHNICAL REVIEW ABSTRACTS

SECTION INDEX

AGRICULTURAL RESEARCH 524a
Plant and animal nutrition; insecticides; fungicides; fertilizers; weed control; soils; etc.

ANALYSIS—CHEMICAL AND PHYSICAL 483a
Methods and apparatus for qualitative and quantitative determination of the composition of matter.

APPARATUS, METHODS, AND STANDARDS 489a
Industrial measurement, inspection, and control; laboratory equipment and procedures (except when auxiliary to other subjects); standards and specifications.

CERAMICS 499a
Abrasives; inorganic cements; glasses; ceramic coatings; structural clay products; refractories; whitewares.

CHEMICAL TECHNOLOGY 504a
Chemical engineering and process equipment; chemistry of materials such as wood, paper, textiles, and coal and petroleum by-products; petroleum refining.

CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL 507a

CHEMISTRY—ORGANIC 514a

CLEANING, FINISHING, AND COATINGS—METALLIC 468a
Buffing and polishing; chemical and electrochemical cleaning and coatings; diffusion, dip, oxide, sprayed, weld-deposited, and vapor-deposited coatings; cladding.

CORROSION 481a
Theory, measurement, and prevention (except by means of coatings).

DESIGN 503a
Design of parts, equipment, and structures (except when auxiliary to other subjects); theoretical stress analysis.

ELECTRICITY AND ELECTRONICS 529a
Electrical and electronic theory, circuits, equipment, and applications (except when auxiliary to other subjects).

FOUNDRY PRACTICE 460a
Melting; casting; pouring; rigging; shakeout and trimming; molding; core and pattern making; metallurgical control.

FUEL TECHNOLOGY 495a
Solid, liquid, and gaseous fuels—their properties and combustion; carbonization, liquefaction, and gasification of solid fuels; synthetic fuels. (For combustion in engines, see Section 21.)

GRAPHIC ARTS 539a
Printing and decorating processes, equipment, and materials; book manufacture; photography.

HEATING, DRYING, AND AIR CONDITIONING 496a
Space heating; cooling; humidification; materials drying and heating; equipment such as ovens, boilers, furnaces, heat pumps, and auxiliaries.

LUBRICATION AND FRICTION 502a
Lubricants and lubricating methods; friction fundamentals; nonmetallic bearing materials; oil filtration; lubricating-system design.

METALLOGRAPHY AND PRIMARY STRUCTURES 470a
Microscopy, diffraction methods and other techniques; phase diagrams; nuclear and crystal structures; microstructures; macrostructures. (For structures resulting from transformation or deformation see Sections 11 and 13, respectively.)

METALS—FABRICATION AND USES 493a
Miscellaneous fabrication procedures; applications of metals, alloys, and specific processes.

SECTION INDEX (Continued)

METALS—MECHANICAL PROPERTIES AND TESTS 476a
Elasticity and plasticity; stresses and stress analysis; fracture; creep; shear; hardness; fatigue; wear resistance; deformation structures.

METALS—PHYSICAL PROPERTIES AND TESTS 474a
Mass, thermal, thermodynamic, chemical, electrical, magnetic, and optical properties.

METALS—PRIMARY WORKING 462a
Preparation for working; forging; rolling; extrusion; swaging; tube making; wire and rod drawing; slitting, sawing, shearing, etc.

METALS—SECONDARY WORKING 463a
Drawing; impact extrusion; forming; stamping; machining and machinability; grinding; honing and lapping; strain hardening; shot peening; flame cutting.

METALS—SMELTING, REDUCTION, AND REFINING 459a
Smelting and reduction of ores; distillation of metals; electrolytic winning and refining; thermit processes; cementation; amalgamation; carbonyl, halide, and hydride processes; ingot practice.

METALS—THERMAL TREATMENT 467a
Homogenization; annealing; normalizing; patenting; quench, precipitation, and case hardening; tempering; stress relief; cold treatment; heating and cooling media. (For effects of thermal treatment, see Sections 11, 12, and 13.)

METALS—TRANSFORMATIONS AND RESULTING STRUCTURE 472a
Diffusion; nucleation and grain growth; recovery and recrystallization; allotropic transformations; precipitation; eutectoid reactions; other solid-state reactions; liquid-phase reactions; solid-liquid, vapor-solid, and vapor-liquid reactions.

METALS—WELDING OR JOINING 464a
Welding; soldering; brazing; weldability and weld tests; bonding metals to nonmetals; adhesive bonding; mechanical fastening.

MISCELLANEOUS 537a
Research and research organizations; general metallurgical articles; mathematics; medical research; patent law; other unclassified subjects.

ORE AND MATERIAL BENEFICIATION 457a
Preparation and concentration of solid materials; roasting; calcining; sintering; nodulizing; briquetting; mineralogy.

PAINTS, VARNISHES, LACQUERS, AND ENAMELS 523a
Organic and inorganic coatings (except ceramic coatings); their composition, properties, application, and testing.

PHYSICS 526a
Theory and practice (except as covered in other sections). Includes aerodynamics; biophysics; flow of gases and liquids; deformation of solids; heat transfer; nucleonics; semiconductivity and superconductivity; ultrasonics; etc.

PLASTICS AND HIGH POLYMERS 518a
Polymerization; properties; testing; processing methods and equipment; compounding. (Does not include rubbers and surface-coating resins.)

POLLUTION AND WASTES 494a
Sampling, analysis, collection, prevention, and treatment of gaseous and liquid wastes, including smoke, fumes, odors, fly ash, dusts, aerosols, sewage, and industrial wastes; by-product recovery; meteorological, topographical, and biological effects.

POWDER METALLURGY 464a
Powder production and properties; mixing; compacting; sintering; post-sintering operations.

PRIME MOVERS 497a
Reciprocating engines; turbines; jet engines; rockets; locomotives; auxiliary equipment; power from atomic fission.

RUBBERS AND OTHER ELASTOMERS 521a
Polymerization; properties; testing; processing methods and equipment; compounding.

STATISTICS AND ECONOMICS 536a
Natural resources; supplies; production and cost data; articles on economic trends.

BATTELLE TECHNICAL REVIEW

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ABSTRACTS†

July 1952

1. ORE AND MATERIAL BENEFICIATION

8365* Theory of Grinding of Minerals. III. Separations of Particles of Coarsely Ground Products Into Two Fractions. (In Russian.) B. M. Zviagin, O. M. Todes, and A. Z. Iurovskii. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1825-1840.

Mathematical analysis plus graphical interpretation.

8366* Autoradiographs as a Means of Studying Distribution of Radioactive Minerals in Thin Section. S. C. Robinson. *American Mineralogist*, v. 37, May-June 1952, p. 544-547.

Describes a simple method of recognizing those grains in a thin section that contribute to its radioactivity. It involves orienting the thin section on the autoradiograph. Apparatus diagram, micrograph, and radiograph.

8367* A Method for Quantitative Radioactivity Measurements of Small Amounts of Radioactive Minerals. H. R. Steacy. *American Mineralogist*, v. 37, May-June 1952, p. 547-550.

Method was found effective for 5-10 mg. samples. The latter and uranium standards are ground and then presented in a uniform manner to a radiation counter by means of a special funnel.

8368* A Method for the Separation of Mineral Grains From Sized Products. H. R. Steacy. *American Mineralogist*, v. 37, May-June 1952, p. 550-551.

Describes above method in which the grains are fastened to paper with drops of a solution of acetone and celluloid and collected in a dish of acetone. It is useful for the preparation of pure mineral samples for chemical or physical examination.

8369* High Quality Sinter From Lean Iron Ores. D. W. Gillings. *Blast Furnace and Steel Plant*, v. 40, June 1952, p. 663-668, 670-671.

Reviews recent technical advances in the sintering of British ores and deals briefly with background and techniques of individual researches. Tables, graphs, and photographs.

8370* Operation of the Creighton Mill of the International Nickel Company of Canada, Limited. *Canadian Mining and Metallurgical Bulletin*, v. 45, May 1952, p. 253-259; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 163-169.

Describes construction and operation of new mill for low-grade Ni ore. Includes sections on crushing, grinding, flotation, tailings disposal, and other features. Tables, diagrams, and illustrations.

8371 Wollastonite: New Mineral Wins Process Uses. *Chemical Engineering*, v. 59, May 1952, p. 270, 272-273.

Crushing and concentration flow-sheet of Cabot Minerals new plant at Willsboro, N. Y. Uses in ceramics, paints, and other products are discussed.

8372 The Upgrading of Minerals, With Special Reference to Coal. E. M. Myers. *Chemistry & Industry*, Mar. 29, 1952, p. 278-286.

Includes brief discussion of treatment methods for a variety of metal ores. Chiefly, reviews coal upgrading under following topics: history, gravity methods, and froth flotation. Diagrams.

8373 Beaver Meadows Fine-Coal Plant. *Coal Age*, v. 57, June 1952, p. 88-93.

Fine-coal cleaning system used at John G. Connell Coal Co., Beaver Meadows, Pa. 2-page flow- and data-diagram. Important features are closed water circuit; controlled pH factor; froth flotation, effective launders; feed and refuse pumping; and "chip-picking" hydrotator.

8374 How to Predict Results of Washing a New Coal. M. R. Geer. *Coal Age*, v. 57, June 1952, p. 96-97.

Discusses way to forecast recovery percentage and final ash content, either in designing a new washery or planning treatment of a different coal in an existing plant.

8375 How to Measure Retention Time in Flotation Machines. T. M. Morris. *Engineering and Mining Journal*, v. 153, June 1952, p. 91.

Describes procedure used at London mill of Tennessee Copper Co. to compare retention times in the bulk rougher and scavenger circuits, and to compare average retention time of water and solids in the bulk rougher circuit.

8376* Computation of Mill Recovery. M. P. Legoux. *Bulletin of the Institution of Mining and Metallurgy*, May 1952; *Transactions*, v. 61, pt. 8, 1951-52, p. 410-414.

Discussion of above paper by C. C. Dell. (Dec. 1951 issue.)

8377 Sinter Production Tied to Plant Design. Martin L. Cover. *Iron Age*, v. 169, June 5, 1952, p. 145-149.

Discusses conditions for maximum production of highest quality sinter, based in part on analysis of sections of the sinter bed of a 6-wind-box machine. Photographs, graphs, and diagrams.

8378* Flotation of Lead-Zinc Ores With High Kaolin Content. (In German.) Werner Gründer and Bela Bunji. *Zeitschrift für Erzbergbau and Metallhüttenwesen*, v. 5, May 1952, p. 182-185.

Describes laboratory experiments on the above. Applications of results of these experiments to the flotation process is indicated. Results of large-scale experiments, justifying certain changes in procedure, are outlined. Diagrams.

8379 Surface Oxidation of Galena in Relation to Its Flotation As Revealed By Electron Diffraction. Hitosi Hagihara. *Journal of Physical Chemistry*, v. 56, May 1952, p. 610-615.

Initial oxidation of galena surfaces was studied in air, in an enclosed atmosphere in galena powder, in a vacuum furnace, in water, and during dry and wet grinding. Electron-diffraction examination of the oxidized faces showed that the lowest oxidation product is, in all cases, $PbSO_4$. In no instance were crystalline carbonate, hydroxide or the lower sulfoxides ob-

†Prepared from books, journals, and other material received by the Battelle Memorial Institute Library.

1. *Ore and Material Beneficiation*

served. Discusses orientation relations and crystal growth. Graph and electron-diffraction patterns. 35 ref.

8380 Mono- and Multilayer Adsorption of Aqueous Xanthate on Galena Surfaces. Hitosi Hagihara. *Journal of Physical Chemistry*, v. 56, May 1952, p. 616-621.

Action of aqueous xanthate on galena surfaces was studied by electron diffraction. Its primary function on both fresh and slightly oxidized faces lies in formation of minute monomolecular patches adsorbed on the galena lattice. Suggests that the monolayer is composed of xanthic acid molecules adsorbed with their polar heads attached to Pb atoms of the galena lattice. The layer is unstable in air. Schematic drawings and electron diffraction patterns. 21 ref.

8381 Collector-Depressant Equilibria in Flotation. I. Inorganic Depressants For Metal Sulfides. II. Depressant Action of Tannic Acid and Quebracho. George A. Last and Melvin A. Cook. *Journal of Physical Chemistry*, v. 56, May 1952, p. 637-648.

In Part I, the "bubble pick up" method of Cooke and Digre was employed to obtain comprehensive equilibrium data for the system potassium n-amylxanthate–sodium sulfite–galena at 25°C. Mechanism developed was found to give a complete and self-consistent correlation of experimental results of this study together with results for 16 other similiar systems studied by Wark. In Part II an investigation of the systems galena–n-amyl xanthate–tannic acid and galena–n-amyl anthate–quebracho was carried out, and the data interpreted by the single-site model for hydrolytic (free-acid) collector-depressant adsorption. Tables, graphs and 24 ref.

8382* Selective Flotation of Metals and Minerals. (In German.) J. H. Schulman and T. D. Smith. *Kolloid Zeitschrift*, v. 126, Apr. 1952, p. 20-32; disc., p. 32-35.

Discusses fundamental principles of the above. Experimental methods of studying different metals and minerals under different conditions are described. Diagrams, graphs, and tables. 13 ref.

8383* Price Plant Specializes In By-Product Coal. *Mechanization*, v. 16, May 1952, p. 85-89.

Coal-preparation equipment and procedures. Illustrated.

8384 The Third Theory of Comminution. Fred C. Bond. *Mining Engineering*, v. 4, May 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 484-494.

Development, proof, and application of above which should eliminate the objections to the 2 old theories and serve as a practical unifying principle for comminution in all size ranges. 11 ref.

8385 Deleading Zinc Concentrate at the Parral and Santa Barbara Mills. C. L. Boeke and G. G. Gunther. *Mining Engineering*, v. 4, May 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 495-498.

Zinc deleading processes at above mills of Cia. Minera Asarco, S. A., Chihuahua, Mexico, are described separately to provide a basis for comparison. Emphasis is on flotation procedures.

8386 Screened Ore Used For Fine Grinding at Lake Shore Mines. Bunting S. Crocker. *Mining Engineering*, v. 4, May 1952; *Transactions of the American Institute of Mining and Metallurgical Engineers*, v. 193, 1952, p. 499-508.

Discusses method of substituting screened rock for steel grinding balls used by Lake Shore Mines, Ltd., Kirkland Lake, Ontario, Canada. Gives results of various tests, reasons for changeover. Tabular data, graphs, and diagrams.

8387 Jacksonville Plant Produces Titanium From Beach Deposit. J. C. Detweiler. *Mining Engineering*, v. 4, June 1952, p. 560-562.

Discusses and pictures operations at the Jacksonville plant of Humphreys Gold Corp. operating under leases from National Lead Co. and Rutile Mining Co. of Florida, which recovers rutile, ilmenite, zircon, and monazite from an ancient beach deposit containing about 2.5% of these minerals in combination.

8388 Impact Crushing for Reduction of Hard-Abrasive Ores. W. W. West. *Mining Engineering*, v. 4, June 1952, p. 563-564.

Describes theory of above and its relation to attrition crushing. Considers in detail the design and operation of impactors.

8389* Pneumatic Flotation Equipment. Frank H. Slade. *Mining Journal*, v. 238, May 23, 1952, p. 530-532.

Low-pressure air provides for maximum bubble attachment in modern flotation equipment used in the treatment of metallic ores, nonmetallic minerals and many other materials. Reviews operation of various types of machines in current use. Diagrams.

8390* Cleaning Small Coal by Froth Flotation. H. G. Hague. *Mining Journal*, v. 238, May 30, 1952, p. 560-562. (Reprinted from *G.E.C. Journal.*)

Gives results of experiments in a British laboratory. Describes and diagrams complete coal-preparation plant and froth-flotation section.

8391* Centrifugal Separation At A Fluid Boundary. D. Tedman. *Mining Magazine*, v. 86, May 1952, p. 274-276.

Describes discovery which led to the development of a continuous separating machine for ore fractions. Laboratory apparatus is diagrammed. Separation of galena and sphalerite has been investigated.

8392* The Tsumeb Story. Part II. Tsumeb Mill Uses Five Flotation Circuits For Copper, Lead, Zinc Oxide and Sulphide Ores. J. N. Ong. *Mining World*, v. 14, June 1952, p. 34-39.

Gives details of crushing, grinding, and concentration flowsheets, equipment, and procedures of above mill, located in Southwest Africa. Products are Cu, Pb, and Zn concentrates.

8393* Factors Affecting Flotation. Part II. (Concluded.) H. J. Gisler. *Pit and Quarry*, v. 44, Apr. 1952, p. 109-112.

Discusses methods of introducing air, kind of gas used to form bubbles, removal of concentrates, types of flotation machines, and applications to metals and nonmetals.

8394* Developments In Producing Phosphate. Walter B. Lenhart. *Rock Products*, v. 55, May 1952, p. 80-84.

Excavation, pumping, washing, flotation, and centrifugal-separation procedures. Flowsheets and photographs.

Miscellaneous Publications

8395 Tests To Determine A Method of Treatment of a Complex Gold Ore From Tarcoola, South Australia. Commonwealth Scientific and Industrial Research Organization and Kalgoorlie School of Mines, Ore Dressing Investigation Report 461, July 4, 1951, 25 pages. (TN44 W52r)

Details of test results on 3 samples are tabulated and conclusions summarized. Flotation, gravity concentration, amalgamation, and cyanidation were employed. Recovery of Au is emphasized. Recovery of Pb or Cu is of doubtful economic merit.

8396 Treatment Tests of Scheelite Ores and Tailings. A. L. Engel. U. S. Bureau of Mines, Report of Investigations 4867, Apr. 1952, 11 pages. (TN21 Un3r)

A compilation of results of preliminary tests on scheelite (tungsten) ores and tailings. These investigations were made to assist in establishing satisfactory treatment methods for small-scale concentrator operations, or to indicate a method for conserving previously lost mineral values in old tailings.

Books

8397 Metodika Issledovaniia Uglei na Obogatimost i Tekhnika Sostavleniia Skhem Obogashcheniia. (Methods of Investigation of Ability of Coals to be Cleaned and Techniques for Planning Cleaning Systems.) B. G. Chernenko. 191 pages. 1950. Coal Technology Publishing House, Moscow and Leningrad, U.S.S.R. (TP325 C42m)

The first part presents methods of selecting and preparing samples for laboratory investigation and describes various methods of laboratory investigation and treatment of the data obtained. The second part described methods of cleaning and tells how to combine different methods for different kinds of coals and different purposes.

See also:
9138 (processing of asbestos minerals)
9834 (recovery of Ni from ores)

2. METALS—SMELTING, REDUCTION, AND REFINING

8398* Peculiarities of Slag Conditions During Melting of Ferro-Mangano-Phosphorus. (In Russian.) A. L. Zagianskii. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 265-267.

A study was made of the changes of viscosity and composition of blast-furnace slag during the production of above material. Data are tabulated.

8399* Metallurgy of Iron, Manganese, and Phosphorus Precipitation in Basic Steel Melts. (In German.) Erich Witten. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 83-93.

Proposes a theory on the mechanism of the reactions between metal and slag during smelting processes. The relationship of the various constituents of slag and their dependence upon basicity and use of P and Mn are indicated. Discusses equilibria involved. Practical applications of the theoretical findings are indicated. Graphs. 34 ref.

8400* Refractories for the Basic Open Hearth Furnace and Auxiliary Equipment. Ernest B. Snyder. *Blast Furnace and Steel Plant*, v. 40, June 1952, p. 651-656.

Detailed description of the refractories used at the present time, service conditions, and possible furnace developments in improved refactories.

8401* Blast-Furnace Dust on the Heating Surfaces of Heat Exchangers. (In German.) Alberts Upmalis. *Brennstoff-Wärme-Kraft*, v. 4, May 1952, p. 159-161.

Two experimental plants were used to investigate the effects of dust on performance of heat exchangers, melting point of dust, heat conduction, and means of combating formation of dust deposits. Photographs, diagrams, and tables.

8402 Surface Defects in Steel and Their Relationship to the Different Stages of the Manufacturing Process. T. Dennison. *Journal of the Electrodepositors' Technical Society*, v. 27, 1950, p. 35-41, disc., p. 42-44. (Preprint.) (TS670 E25j)

A lecture. Describes manufacture and fabrication, including hot and cold rolling, of steel. Relates the various stages in the manufacture of steel to formation of surface defects which largely determine ease of polishing and freedom from porosity of electrodeposit. Macrographs.

8403* Separation of Cadmium-Zinc Alloys by Vacuum Sublimation. (In German.) Walter Scheller and W. D. Treadwell. *Helvetica Chimica Acta*, v. 35, no. 3, 1952, p. 745-753.

Experiments on above with high-purity Zn-Cd alloys revealed an additional point on the solidus of the Cd-rich solid solution at 250°C. Dezincification of a Zn-poor Cd alloy with steam at 400°C. showed that the process proceeds rapidly until the Zn content is reduced to 0.0035%. Diagrams, tables, and graphs. 12 ref.

8404 Thermodynamic Calculations of Slag Equilibria. H. Flood and K. Grjotheim. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 64-70.

The equilibrium constant of reactions in molten slags, expressed in terms of ion concentrations, is shown to be frequently influenced by concentrations that do not enter into the formal equilibrium equation. A simple thermodynamic relation is derived between equilibrium constant and concentrations of ions not entering into the equilibrium equation. 10 ref.

8405* Some Further Experiments With Rimming Ingots. D. Binnie. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 71-74.

Analysis of 2-ton ingots of rimming steel cooled in refractory-lined molds shows that these larger ingots have similar features to those of the smaller 3-cwt. ingots. examined previously, except that there was a general rise in impurities towards the axis of the larger ingots. They differ from ingots made in conventional hematite molds, having no peak value of the impurities at the rim/core junction and no clear indication of minimum values in the rim itself. This shows a need for revision of existing theories. 11 ref.

8406 Electrode Economy in Electric Arc Furnaces For Steelmaking. R. Toye and D. I. Bell. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 86.

Outlines recent work on influence of physical properties on electrode quality, and of electrode diameter on electrode consumption. Effects of sheet-metal sleeving and of sprayed Al coatings were also evaluated.

8407 Flow Visualization in Open-Hearth Furnace Models. J. A. Leys. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 86.

Suggests use of balsa dust in the above. The model can then be illuminated and the flow patterns photographed.

8408 Electric Furnace Smelting of Zinc Ores; The Sterling Process. E. C. Handwerk, G. T. Mahler, and L. D. Fetterolf. *Journal of Metals*, v. 4, June 1952, p. 581-586.

Describes new process by which Zn metal, together with its accompanying values, and pig iron, are produced. All of these elements except for a controlled amount of iron are almost completely eliminated from the slag. It has been used on high-grade Zn concentrates from which substantial recovery of secondary values can be realized. The Pb, Cd, and some of the Ag, are collected in the Zn metal, while Cu, Au, and the remaining Ag are concentrated in the pig iron.

8409 Effect on Production Rates of Foreign Ores as Open Hearth Charge Ore: Liberian Ore. R. P. Carpenter. **Moroccan Ore.** C. C. Benton. *Journal of Metals*, v. 4, June 1952, p. 592-593.

First article describes experiences of Republic Steel Corp. with Liberian ore. Second article deals with use of Moroccan ore by Fairfield Steel Works, Tennessee Coal & Iron Div., U. S. Steel Co. Data are tabulated.

8410 Some Aspects of Titanium Metallurgy. W. J. Kroll. *Metal Industry*, v. 80, May 2, 1952, p. 343-345; May 9, 1952, p. 383-386, 388.

Primarily devoted to chemistry as a basis for Ti production methods. Presents and gives detailed discussion of a table of physical properties of Ti compounds. Discusses the more common reducing agents, their chlorides, and fluorides. Considers the possibilities of Ti reduction by means of various metals, indicating process involved, feasibility, kind of metal obtained, and disadvantages. 23 ref.

8411 Solidification of Castings. *Metal Industry*, v. 80, May 16, 1952, p. 406-409; May 23, 1952, p. 427-429; disc., p. 429.

Papers presented at University of Birmingham Industrial Metallurgy Dept. Conference: "Basic Theory of Heat Transfer in Moulds," F. L. Daws; "Application of Heat Transfer Theory in Ingot Casting," J. J. Pick; "Application of Heat Flow Theory to Sand Castings," G. Martin. 64 ref.

8412 Metallurgy in the Carbon-Rod Radiant-Resistor Furnance. *Metal Treatment and Drop Forging*, v. 19, May 1952, p. 197-202. (Translated and condensed from "Metallurgy in the Graphite-Bar Furnace," W. Gödecke, *Giesserei*, v. 38 (new ser., v. 4), Apr. 19, 1951, p. 169-174.)

Previously abstracted from original.

8413* Slags and Oxides in Steel Ingots. (In French.) Marcel Guédras. *Métallurgie et la Construction mécanique*, v. 84, May 1952, p. 299-300, 303.

Defines the above. Reviews modern methods for eliminating such inclusions, particularly from toolsteels and special steels. Micrographs.

8414 Removal of Impurities From Tin by Vacuum Distillation. J. W. Price. *Nature*, v. 169, May 10, 1952, p. 792.

Describes use of above procedure in order to produce extremely pure tin. A specimen was heated in an evacuated silica tube at 1000°C. for 4 hrs., after which spectrographic examination showed As, Sb, Pb, and Bi to be absent. A colorimetric method showed the As content to be less than 0.0002%.

8415 Pre-Refining by Means of Pure Oxygen of Bessemer Melts of High Silicon Content. Application to Bessemer

2. *Metals—Smelting, Reduction, and Refining*

Melts Produced in the Acid Blast Furnace. (Concluded.) (In French.) P. Leroy. *Revue de Métallurgie,* Apr. 1952, p. 299-320.

Problems involved in blast-furnace processing of several French iron ores. Examines critically the various possible solutions. Discusses increase of temperature of the melt due to prerefining, specific heat of the liquid melt, comparison of physicochemical characteristics of castings; and tests on oxygen blowing into the stream of molten metal leaving the blast furnace. Extensive tables and graphs. 23 ref.

8416* Preparation of Silicon by Aluminothermic Methods. (In French.) Jean de Postis and Raymond Muraire. *Bulletin de la Société Chimique de la France,* Mar.-Apr. 1952, p. 282.

Briefly describes development of a laboratory procedure for the above, in which silica is reduced by a mixture of S and Al.

8417* The Hot-Blast Cupola and Its Metallurgical Applicability. (In German.) Kurt Guthmann. *Stahl und Eisen,* v. 72, May 8, 1952, p. 545-556.

The cold-blast cupola as a pre-melting plant for the steelworks. Development of the hot-blast cupola and its place in metallurgical processes. Range of production. Behavior of C, Si, Mg, P, and S. The basic-lined, hot-blast cupola. Raw materials charged. Remelting of pig-iron, blown in acid blast furnaces with addition of domestic ores, in the hot-blast cupola for charging to the basic converter. Premelted metal from steel scrap, sintered ore, etc., as a liquid charge for openhearth furnaces. Numerous diagrams, tables, graphs, and illustrations. 48 ref.

8418* Influence of the Hot-Blast Cupola Operation on the Economy of Openhearth Steel Ingot Production. (In German.) Gottfried Prieur. *Stahl und Eisen,* v. 72, May 8, 1952, p. 556-561.

Situation of steel-ingot production at the end of 1950. Fundamental tendencies of further development. Prime cost of iron from the hot-blast cupola. Influence of charge and processing costs of openhearth steel on furnace efficiency, output, and steel-ingot production capacity. Tables and graphs.

8419 Blast Furnace Practice. XI (a-c). Beneficiation of Air. Charles E. Agnew. *Steel,* v. 130, June 2, 1952, p. 102, 104, 106, 109, 112, 115, 118, 121; June 9, 1952, p. 106, 108, 111-112 ,114, 117, 120, 122; June 16 ,1952, p. 142, 144, 146.

Factors that influence the value of dry and moist blast on furnace operating economy, and relationship between high-pressure blowing and raw materials are explained in June 2 issue. June 9 issue tells how control of temperature head in the lower bosh permits successful use of oxygen without disturbing temperature balance in the shaft raw-material-preparation operation. June 16 issue emphasizes importance of effects of raw material chemical composition and blowing rate on the shaft raw material-preparation capacity. (To be continued.)

8420* The Construction of Uniflow Steel Melting Furnaces. (In Russian.) M. A. Glinkov. *Za Ekonomiiu Topliva,* v. 9, Feb. 1952, p. 25-27.

Presents a discussion of the uniflow process in openhearth furnaces as a mans of increasing production and simplifying operation.

8421* Recuperative Steel Furnaces. E. A. Nitskevich. *Za Ekonomiiu Topliva,* v. 9, Feb. 1952, p. 28-29.

Discusses the construction of this type of steel furnace and briefly explains its advantages over usual openhearth furnaces.

8422* Role of the Aggregation State of Hard-to-Reduce Oxides During Their Reduction by Carbon in Industrial Furnaces. (In Russian.) A. S. Mikulinskii. *Zhurnal Prikladnoi Khimii,* v. 24, Dec. 1951, p. 1235-1245.

Various problems connected with the production of materials such as Si from SiO_2 are discussed. The vapor stage of SiO was found to be very important. 16 ref.

Miscellaneous Publications

8423 Recovery of Lithium From Spodumene-Amblygonite Mixtures. L. H. Kalenowski and S. M. Runke. U. S. Bureau of Mines, Report of Investigations 4863, Apr. 1952, 5 pages. (TN21 Un3r)

On a laboratory scale, amblygonite, spodumene, and several mixtures of them were roasted with varying amounts of lime and gypsum at several temperatures. The sinters were ground and leached with water to recover the portion of lithium converted into the sulfate. Recoveries were obtained closely approximating those previously reported for similar sized operations. A single set of conditions was determined that would give good recoveries from the two minerals and mixtures of them.

Books

8424 Metallurgiia Legkikh Metallov. (Metallurgy of Light Metals.)**Ed. 3.** A. I. Beliaev. 428 pages. 1949. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (TN799 B41m)

Describes extractive metallurgy of the most important light metals—Al, Mg, Be, Ca, Ba, and Li. Properties, fields of application, technology of production, and theoretical bases of production are dealt with. Tables, graphs, and diagrams. 121 ref.

8425 Electrolytic Manganese and Its Alloys. Reginald S. Dean. 257 pages. 1952. Ronald Press Co., New York. (TN799.M3 D34e)

Restricted to production of electrolytic Mn, to properties and uses of alloys in which it is necessary, and to alloys in which electrolytic Mn produces properties significantly different from the use of other types of Mn. Much of the material is from published reports of the Bureau of Mines, but a substantial amount of hitherto unpublished material has been included. Numerous graphs, tables, and photomicrographs. 250 ref.

8426 Die Edelstahlerzeugung Schmelzen, Giessen, Prüfen. (Production of High-Quality Steel.) Franz Leitner and Erwin Plöckinger. 490 pages. 1950. Springer-Verlag, Vienna, Austria. (TN730 L53c)

Detailed discussion of the fundamentals of metallurgical reactions and their relationship to industrial experiences. Reviews the theoretical basis of metallurgy, the solidification process, and the practical side of production and casting. A special chapter treats control of the melt. Data are extensively charted and tabulated.

8427 Raschet Domennykh Shikht. (Calculation of Blast-Furnace Charges.) M. A. Pavlov. 258 pages. 1947. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (TN677 P28r5)

Method of determination of the relationship between ores charged, fluxes, and fuel ash content, so that the type of cast iron obtained will correspond to the proper amount of slag of required properties. Tells how these ratios are expressed during preparation of charges for different types of cast iron and describes calculation methods to be applied in each case.

8428 Metallurgische Verarbeitung von Altmetallen und Rückstanden. Band II. Altrotmetalle. (Metallurgical Processing of Industrial and Domestic Scrap Metals. Vol. II. Copper Scrap.) Edmund R. Thews. 290 pages. 1951. Carl Hanser Verlag, Munich, Germany. (TS214 T34m)

Discusses problems and work of remelting plants for copper, brasses, and bronzes, such as sorting of red scrap, general conditions for processing, processing of furnace scrap, and a review of the great variety of older-type alloys which still are represented in scrap. Diagrams, tables, charts, photographs, index.

See also:
8667 (sweating out in ingots)
9154 (symposium on steel-plant refractories)
9162 (pyro-processing equipment)

3. FOUNDRY PRACTICE

8429 Cement-Bonded Molding Sand. C. D. Galloway. *American Foundryman,* v. 21, May 1952, p. 67-69.

Reviews some of the studies and experiences of a cast-iron foundry in making the change from dry sand to cement.

8430 Effects of Annealing on the Removal of Burned-On Sand. Donald Alverson. *American Foundryman*, v. 21, May 1952, p. 91-92.

Explanation, in terms of physical rather than chemical changes, is supported by micrographic studies of two cast-iron test castings taken from normal production runs.

8431* Influence of the Equilibrium Diagram on Shrinkage During Solidification. (In French.) Andre Tatur. *Fonderie*, Apr. 1952, p. 2884-2897.

Relationships between shrinkage during solidification, chemical composition, and period of solidification, as well as factors affecting pipe formation, were studied. Experiments conducted on pure Pb, Sn, Zn, Cd, and Bi; and on Pb-Sn, Zn-Cd, and Mg-Zn alloys. Graphs, tables, diagrams, and photographs. 28 ref.

8432 Ductile Iron. Its Significance to the Foundry Industry. Albert P. Gagnebin. *Foundry*, v. 80, June 1952, p. 128-131, 226-230, 232-240.

Considers spheroidal graphite cast iron, outlining knowledge available at the present time with respect to its manufacture, properties, and applications; and discusses economic prospects. Tables, graphs, and photographs. 14 ref.

8433 Tentative Specifications for Magnesium-Base Alloy Sand Castings. *Foundry*, v. 80, June 1952, p. 189-190.

Foundry data sheet. ASTM designation is B80-51T. Covers chemical analysis and mechanical properties.

8434 Casting the Superalloys. Thomas A. Dickinson. *Foundry*, v. 80, June 1952, p. 255-256.

Brief discussion of the above for some typical superalloys including a metal-ceramic. Includes table of some physical, mechanical, and corrosion-resistant properties.

8435 Ways and Means to Increased Productivity. John Hunter. *Foundry Trade Journal*, v. 92, May 1, 1952, p. 457-462.

Gives general factors affecting productivity in the foundry industry. Examines in detail major influences and means for improvement. Covers patterns, molding boxes, manual effort, roller-track, overhead hoppers, sandslingers, and rubbish disposal. Interrelation with plant utilization is particularly emphasized. Tables, graphs, and diagrams.

8436* Production of Castings in Aluminium-Bronze, D.T.D. 412. L. Hargreaves. *Foundry Trade Journal*, v. 92, May 8, 1952, p. 487-489.

Describes experimental development of procedure for the above. Illustrated.

8437 Some Casting Problems of Copper/Lead Alloys. P. D. Liddiard and P. G. Forrester. *Foundry Trade Journal*, v. 92, May 15, 1952, p. 509-515; disc., May 22, 1952, p. 541-545.

Casting of above alloys as linings onto steel shells has many problems, some not common to the casting of solid bodies. Considers first theoretical aspects, such as equilibrium diagram of the system, effect on it of other elements, etc. Summarizes problems anticipated, and examines practical methods being used to produce these linings by casting. Methods used in Great Britain, this country, U. S. and on the Continent are critically reviewed and compared. These cover static, centrifugal, and continuous processes. 10 ref.

8438 Synthetic Resins in the John Harper Foundry. J. W. Dews and P. H. Drury. *Foundry Trade Journal*, v. 92, May 22, 1952, p. 535-539, 550.

Describes experiences in the development of a urea-formaldehyde liquid-resin core-binder in preparation for large-scale operation. Tables and photographs.

8439* Crucible Induction Furnaces for Operation on Power-Line Frequencies. (In German.) R. Lethen. *Giesserei*, v. 39, Apr. 3, 1952, p. 145-152.

Describes development of above furnaces for melting metals. Tables, graphs, diagrams, and photographs.

8440* Determination of the Formation of Shrinkage Cavities in Malleable Cast Iron. (In German.) A. Bordes. *Giesserei*, v. 39, May 1, 1952, p. 201-203.

Describes a new method for the above. It facilitates determination of the tendency toward formation of shrinkage cavities, and of the various factors acting upon it. Diagrams and photographs.

8441* Suggestions for Examination of Core Sands, Core Binders, and Cores. (In German.) F. Roll. *Giesserei*, v. 39, May 1, 1952, p. 203-207.

Reviews chemical, microscopic, physical, and technological suggestions for examining the above on the basis of the literature. 31 ref.

8442* The Sand Triangle. (In German.) H. Jungbluth. *Giesserei*, v. 39, May 15, 1952, p. 225-232.

Discusses problems of foundry-sand-test standardization in Germany. Outlines the method suggested by W. Reitmeister, as discussed by W. Götz. Numerous graphs.

8443* Nodular Cast Iron. (In Swedish.) Lars Barrling. *Gjuteriet*, v. 42, Apr. 1952, p. 55-61; disc., p. 61-62.

Describes experiments at SKF, Katrineholm, on producing nodular cast iron on an industrial scale. Relationship between structure of cast iron and mechanical properties is dealt with and different methods of making nodular cast iron are described. At SKF, nodular cast iron is made by adding approximately 1.5% of a Ni-Mg alloy containing 15% Mg to the melt at 1400-1450°C. The melt is then inoculated with 75% ferrosilicon so that the silicon content is increased by 0.5-0.1%.

8444 Job Foundry Tackles Shell Mold Production. G. Palmer Derby. *Iron Age*, v. 169, May 15, 1952, p. 109-113.

Shell-mold castings of gray and ductile iron were successfully produced in a pilot-plant operation at Lynchburg Foundry Co., Lynchburg, Va. Two men handle all operations on the 4-station machine used to produce the molds. Photographs.

8445 Core Maker Uses Ultramodern Controls. Leon F. Miller. *Iron Age*, v. 169, May 15, 1952, p. 114-117.

Automatic electric timers, solenoid air valves, and air cylinders control the Osborn Mfg. Co.'s coremaking machine. Operated by 2 men, production of over 300 cores per hour has been recorded. Diagrams and photographs.

8446 Small Plants Favor Induction Furnaces. Lewis B. Reed. *Iron Age*, v. 169, May 29, 1952, p. 79-81.

Small plants in the Los Angeles area have found electric induction furnaces more suited to their needs than gas furnaces—despite higher melting costs of the former. Lower maintenance costs, silicon dispersion without labor, and better temperature control are cited. Also in favor are the lack of noxious and sulfurous fumes, lowered operator fatigue, and lack of heat, open flames, and fire hazards. Induction furnaces permit high metal recovery.

8447* Studies of Gases Evolved on Solidification of Molten Cast Iron. III. On the Effect of Humidity. (In English.) Minao Otsuka. *Japan Science Review*, v. 2, Aug. 1951, p. 197-202.

Variation of percentage of foundry scrap between the dry and rainy seasons was studied. Data on monthly percentage of waste products in some foundries were collected and analyzed. Cast irons were melted on days of high and low humidities in an electric furnace and a 1-ton cupola, and the gases evolved on solidification were collected and analyzed. In order to determine whether H_2 from iron hydroxide penetrates into molten Fe or not, cast iron, to whose surface iron hydroxide adheres, was added, gases evolved on solidification were collected and analyzed. Also moist air of various humidities produced by bubbling, as well as steam, was blown onto molten iron surfaces, the slag being removed before and during blowing. Evolved gases were analyzed. Data are charted and analyzed.

8448 Electromagnetic Levitation of Solid and Molten Metals. E. C. Okress and D. M. Wroughton. *Journal of Applied Physics*, v. 23, May 1952, p. 454-552.

Describes an unconventional method of heating and melting metals without a crucible, by suspension in space with an electromagnetic field, thus avoiding difficulties of container material for high-melting point metals. Operating conditions for certain cases are given. Preliminary results with various forms and masses of metal are described. Considerations con-

3. *Foundry Practice*

cerning the atmosphere in which levitation occurs are also included. Graphs, diagrams, and photographs.

8449 Melting of Undoped Silicon Ingots. J. Hino and H. E. Stauss. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 656.

Discusses problem of preparation of Si in bulk form. The usual method involves use of selected added constituents as "doping" agents. Discusses two basic problems in producing Si ingots free of doping additions: prevention of spitting and prevention of cracking of the ingot during freezing.

8450 Some Experiments With Ductile Cast Iron. C. C. Hodgson and C. S. Johnson. *Metallurgia*, v. 45, May 1952, p. 218-224.

An investigation to enable comparison between the above and blackheart malleable cast iron. Deals with production of the iron on a laboratory and plant scale; influence of raw materials on the response to nodulization, and relationship between chemical composition and mechanical properties of annealed ductile cast iron; full-scale foundry tests; and machining tests. Tables, micrographs, and graphs.

8451* Continuous Casting and Rolling Venetian Blind Slat Stock. *Modern Metals*, v. 8, May 1952, p. 45-48.

At Riverside Calif., plant of Hunter Douglas Corp., the machine—particularly the casting unit—is well adapted to the mass production of many other Al products. Melted ingots are poured into horizontal bars of any desired length, then continuously rolled into ⅜-in. thick strip. Also describes mechanized surface-preparation and painting installation.

8452* Modern Foundry Practice. T. W. Bushnell. *North East Coast Institution of Engineers & Shipbuilders, Transactions*, v. 68, Apr. 1952, p. 277-312.

Recent history; making of the "perfect casting;" description of a new general foundry dept.; problems and heat treatment in steel-castings production; testing and inspection methods; and tables of chemical composition and mechanical properties. Radiographs and micrographs.

8453* How Intaglio Lettering and Design Are Die Cast Without Retracting Slides or Loose Cores. W. M. Halliday. *Precision Metal Molding*, v. 10, June 1952, p. 28-29, 78-83.

British procedure. Detailed drawings.

8454* New Developments in Continuous Casting. (In German.) Otto Schaaber. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 181-190.

Reviews the above on the basis of the literature, particularly factors responsible for difficulties, the casting properties of steel, Cu, and Al. Describes new type installations for continuous casting of nonferrous metals and steel. Schematic drawings. 41 ref.

Books

8455 Chill-Cast Tin Bronzes. D. Hanson and W. T. Pell-Walpole. 368 pages. 1951. Edward Arnold & Co., London. (TS570 H19c)

Comprehensively treats metallurgy of bronze with special reference to ingots and castings made in metal molds. Casting in sand molds is not dealth with. Begins with a historical chapter and one on inspection and testing. These are followed by chapters on phase relationships, melting and casting (5 chapters), segregation, properties and uses, effects of minor constituents and their impurities, heat treatment, and, finally, a chapter on fabrication, properties, and uses of wrought bronzes. Numerous tables, graphs, micrographs, macrographs, and references.

See also:
8412 (production of nodular cast iron)
8426 (solidification of high-quality steel)
8593 (Russian casting practice)
8725 (casting Mg-Zr–rare earth alloys)
8728 (testing of molten cast iron)
8951 (casting of lead bronze bearings)

4. METALS—PRIMARY WORKING

8456* The Negative Lubricating Action of Certain Liquid Media During Deep Drawing of Metals With Thinnng of the Walls. (In Russian.) S. Ia. Veiler. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 709-712.

Drawing tests were made using various lubricants. Liquids such as CCl_4 were found to increase the tangential stresses and to increase the microhardness of the surface of the drawn parts. Data are tabulated and charted.

8457* Calculation of Drawing-Die Diameters for Multiple Drawing Machines. (In German.) Werner Lueg. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 95-101.

Proposes a graphical method for determining the mean diameter of wire-drawing dies, based upon the method of E. L. Baay. Method for development of a generally valid diagram for this purpose is indicated. In addition, use of a slide rule for rapid determination of drawing-die diameter and related factors is described. Diagrams and graphs.

8458* The Forces and Tensions of the Wire Drawing Process. E. Siebel. *Draht* (Wire) (English Ed.), Dec. 1951, p. 11-15.

Discusses first theoretical aspects of the above and then practical implications of this knowledge. Graphs.

8459* Area Reduction and Distribution of Draws For the Drawing of Iron and Steel Wire. Friedrich Kohlhase. *Draht* (Wire) (English Ed.), Dec. 1951, p. 15-17.

Presents method of calculations, table of values for use in connection with them, and numerical examples.

8460* Temperature Measurements in Wire Drawing With A Wire-Die Thermocouple. W. Lueg. *Engineers' Digest*, v. 13, May 1952, p. 160. (Translated and condensed from *Stahl und Eisen*, v. 71, Oct. 25, 1951, p. 1140-1147.)

Previously abstracted from original.

8461 Automatic Forging Presses Feature New Shell Line. John A. Verson and Henry Irwin. *Iron Age*, v. 169, May 22, 1952, p. 117-125.

Full automaticity and fast production of closed-die forgings on large mechanical presses are features of press line engineered and built by Verson Allsteel Press Co. No manual labor is needed from the time the billet leaves the furnace until the finished shell drops onto the conveyor belt. Water-cooled die pots and punches are used. Transfer equipment is air-driven and electrically controlled. Diagrams and illustrations.

8462 Cold Rolling With Strip Tension. Part I. A New Approximate Method of Calculation. *Iron & Steel*, v. 25, May 17, 1952, p. 211-216; disc., p. 251-256.

Describes computational work and presents the results graphically in a form which allows roll force and torque to be calculated rapidly and simply.

8463 Cold Strip Rolling; Effect of Tension on Torque and Roll Force. W. C. F. Hessenberg and R. B. Sims. *Iron & Steel*, v. 25, May 17, 1952, p. 217-220; disc., p. 251-256.

The principal experimental results comprise measurements of roll force and torque at reductions of approximately 30 and 50%, on annealed material and on material which had previously been cold rolled to a reduction of about 40%. Results are also included for annealed strip during cold rolling.

8464 Phosphate Coatings as Lubricants in the Severe Cold Forming of Metals. Part 1. General Description. S. Spring. **Part 2. Application.** Ludwig K. Schuster. *Iron and Steel Engineer*, v. 29, May 1952, p. 64-71; disc., p. 71.

Presents general description of above including formation and mechanism of action. Describes application of these coatings to stamping; wire, tube, and deep drawing; and cold-extrusion operations in the steel industry; and the effects observed under these conditions. Tables.

8465 The Development of the Tinplate Trade With Particular Reference to the Installation of the Cold-Reduction Plant at Trostre, Llanelly. H. Leighton Davies. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 15-37.

Presidential address. Provides extensive description of the

above, including history of development of present-day equipment and procedures. Includes steel-sheet rolling, pickling, cleaning, annealing, shearing, and electrolytic and hot-dip tinning. Numerous diagrams and illustrations.

8466 Comparisons Between British and American Rolling-Mill Practices. G. Foster. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 87-91; disc., p. 91-96.

From report of British Iron and Steel Productivity Team.

8467* Measurement of Die Pressures in Wire Drawing By Photoelastic Methods. P. M. Cook and J. G. Wistreich. *Journal of Applied Physics*, v. 3, May 1952, p. 159-165.

Above accomplished by drawing Pb-Sn alloy strips through a wedge-shaped die made of stress-optically sensitive plastic. Filon's method of stress analysis was used. The pattern of isoclinics was found to have new features. Photographs, diagrams, and graphs. 10 ref.

8468* Developments in Cold-Flow Pressing and Extrusion of Steel. Karl Sieber. *Machinery* (London), v. 80, May 22, 1952, p. 891-897; May 29, 1952, p. 937-941. (Reprinted from *Draht* (Wire).

Before dealing with developments in cold-forging techniques, fundamental factors governing the plastic behavior of metal during cold forming are considered. Diagrams and graphs.

8469* The Heating of Dies in Metal Tube-Drawing and Extrusion Presses. (In German.) K. Laue and M. Arenz. *Metall*, v. 6, Apr. 1952, p. 188-190.

Reviews older and modern die-heating installations on the basis of the literature. Photographs and diagrams.

8470* Application of the Theory of Plasticity to the Shaping of Metals. Rolling of Thin Strips. (In French.) J. Lerebours-Pigeonniere. *Métaux: Corrosion—Industries*, v. 27, Mar. 1952, p. 119-134.

Discusses properties of hot and cold metals, problems caused by contact of machine parts with the metal, and application theory of plasticity to rolling of thin strips. Diagrams and graphs. 19 ref.

8471* Study of the Surface Defects of Rolled Aluminum Semifinished Products: "Netting". (In French.) J. Hérenguel, M. Scheidecker, and F. Santini. *Revue de Métallurgie*, Apr. 1952, p. 283-292.

"Netting" is a surface defect characterized by a network of grooves (or fine cracks) visible on the surface of above products, the depth of which is limited to a few or thousandths of a millimeter. Causes, means of elimination, and preventive measures are discussed. Micrographs and tables.

8472* Design and Operation of Modern Soaking Pits and Equipment. (In German.) Oskar J. Stebel. *Stahl und Eisen*, v. 72, Apr. 24, 1952, p. 466-474; disc., p. 474-475.

Describes, diagrams, and illustrates various types of the above. Includes burners, refractory linings, recuperators, fuels used, preheating of air and gas, slagging practice, fuel consumption, etc.

8473 Fiberglass Sheath the Secret: New Method Makes Stainless Extrusion Practical. *Steel*, v. 130, June 2, 1952, p. 92-96.

Describes, diagrams, and illustrates new equipment and procedure now being used by Babcock & Wilcox's Tubular Products Div., Beaver Falls, Pa. Consists of the first American extrusion press having the speed and other design features necessary to take full advantage of the French Ugine-Sejournet hot-extrusion process. The plant has successfully extruded Croloys 18-8S (Type 304), 18-8S Tl (Type 321), 25-20 (Type 310), 16-13-3 (Type 316) and 27 (Type 446); pure Mo; and pure Ti. Noteworthy also is extrusion of a tube from a round-cornered, square, continuous-cast billet, wherein a finished tube was produced from molten steel in just 3 operations. A Fiberglas sock melting on contact with the hot steel prevents seizing of the billet and tools, and insulates the tools from heat. Excellent lubricating properties of the glass reduce friction and make possible increase in billet length.

8474 Applications of Electric Upset Forging. Paul Granby. *Steel Processing*, v. 38, May 1952, p. 228-231, 243.

Describes the above process whereby an automatic electric upsetting machine is used to heat the initial round or flat stock and simultaneously upset it into a head which will contain the exact volume of metal required for forming the final shape. Typical applications are production of poppet valves for internal-combustion engines and of jet-engine blades. All kinds of ferrous and nonferrous metals can be handled. Photographs and diagrams.

8475* Straightening Structural Members in Place. Howard L. Harrison. *Welding Journal*, v. 31, May 1952, p. 257s-262s.

Results of research on underlying principles of methods used successfully in straightening damaged bridge members and effects on the metal of these methods. Describes present straightening techniques, experiments with members under load, and suggested straightening procedures. Results of tension, hardness, and impact tests, and of microstructural examination of straightened mild-steel flat bars, are summarized.

8476* Practical Exploitation of Recuperative Rolling-Mill Furnaces. (In Russian.) P. V. Kobiakov and M. M. Kotrovskii. *Za Ekonomiiu Toplivа*, v. 9, Mar. 1952, p. 8-12.

Discusses the construction and fuel economy of above type of furnace. Data are charted. Includes diagrams.

See also:
8402 (hot and cold rolling of steel)
8451 (rolling Al venetian-blind stock)
8486 (forging of metals)
8704 (tensile and cold-rolling tests)
8735 (Cu, Ni, and Sn in mild steel—hot-working effects)

5. METALS—SECONDARY WORKING

8477* Machining of Aluminum and Its Alloys. (In German.) K. Specht. *Aluminium*, v. 28, May 1952, p. 146-150.

Details, not only with tool shapes for a variety of operations, but also with permissible rates. Diagrams and graphs.

8478 Tubes From Slugs: 125 Extrusions per Minute. Frank Charity. *American Machinist*, v. 96, May 26, 1952, p. 100-101.

Downward extrusion, or "squirting," is employed in a 75-ton press to produce aluminum tubes to close specifications at AiResearch. Impact, heat (99°F.), and pressure cause the metal to squirt through a space between the mandrel and the die walls, thus creating a continuous Al tube. Illustrated.

8479* Feedback Control Systems Highlighted at Machine Tool Forum. *Electrical Manufacturing*, v. 49, June 1952, p. 126-132, 312, 314, 316, 318, 320.

Discusses papers presented at 16th annual Westinghouse Machine Tool Electrification Forum. They cover: 6 regulated drive systems in feedback servo control; magnetic amplifiers for fast response; photocell tracer control of a milling machine; control transformers; thermal overload relays; and group fusing of motors. Graphs, circuit and other diagrams, and table.

8480* Hot Forming With Resistance Heat. *Electrical Manufacturing*, v. 49, June 1952, p. 144-145.

Describes equipment and process developed by Westin Process Co., Elm Grove, Wis., for various hollow parts. Resistance welder transformer supplies high amperage current to the workpiece through die contacts.

8481* Instruments For Force and Temperature Measurement In Metal Cutting. H. Optiz and K. Küsters. *Engineers' Digest*, v. 13, May 1952, p. 145-148. (Translated and condensed from *Werkstatt und Betrieb*, v. 85, Feb. 1952, p. 48-47.)

Describes above instruments. They include tool-force dynamometers used for measuring forces when turning and shaping or planing. Four such instruments were developed, covering a range from 50 to 15,000 kg. A measuring system using strain gages was developed also. Photographs, schematic diagrams, and oscillograms.

8482 Another Electro-Machining Method Shows Promise. I. Weber. *Iron Age*, v. 169, May 29, 1952, p. 88-90.

Electro-erosive machining method, combining electrolytic and electro-arcing effects, being developed at Frankford Arsenal Hardness has no effect on cutting time. But thinner wheels,

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more current, and higher wheel speed, all reduce cutting time. Method can be used for cutting or grinding carbides. Machine now being built will be capable of cutting, tool grinding, boring, and chip-breaker grinding.

8483* Studies on the Surface Roughness of Metals Finished by Cutting. (In English.) Norio Takenaka. *Japan Science Review*, v. 2, Aug. 1951, p. 147-148.

In order to investigate the effect of the built-up edge on surface roughness in the cutting direction, 0.1%-C mild steel and high-speed steel were used for test pieces and tool respectively. A round bar, 30 mm. in diam. and 100 mm. long, on the surface of which were grooved square threads of 2-mm. pitch was placed in a lathe, and the thread crests cut with tools having single straight edge. Numerous diagrams, surface profiles, and graphs.

8484* Influence of Point of Application of Cutting Oil on Tool Life. William E. Lauterbach. *Lubrication Engineering*, v. 8, June 1952, p. 135-136.

Outlines results of experiments on life of a single-point tool in a lathe-turning operation.

8485* Metallurgical Factors Influencing Machinability. *Machinery* (London), v. 80, May 8, 1952, p. 813-814. (Based on paper by K. J. B. Wolfe and Peter Spear.)

Discusses above, particularly the factors of hardness, microstructure, soft metal additions, and nonmetallic inclusions. Deals with carbon and toolsteels and brass.

8486 The Hot Working of Metals. H. K. Barton. *Machinery* (London), v. 80, May 15, 1952, p. 848-852.

Deals specifically with mass production of bolts, capscrews, and similar items. Emphasizes mechanical features such as die design and sequence of operations. Such aspects as importance of stressing metal in compression, and special requirements for light-alloy forgings are also considered. Diagrams.

8487* Compact, Powerful Machine Cuts Cost of Forming Shallow Parts. *Machine and Tool Blue Book*, v. 48, June 1952, p. 147-151.

A new direct-acting, hydraulic, metal-forming machine, 0.1 the size of conventional presses, yet capable of exerting up to 3 times the pressures currently used to form sheet-metal parts used in airplane construction. Use will not be limited solely to the aircraft industry. Diagrams and illustrations.

8488* Cutting Forces During Rapid Cutting by Wide Cutters. (In Russian.) A. Ia. Lopata. *Stanki i Instrument*, v. 22, Dec. 1951, p. 23-25.

Dependence of cutting forces on cutting rate were determined for two steels (plain carbon and a Cr ball-bearing steel). Data are tabulated and charted.

8489* Dynamometer for Measuring Cutting Forces in Order to Determine Lathe Efficiency. (In Russian.) G. A. Levit. *Stanki i Instrument*, v. 22, Dec. 1951, p. 25-27.

Equipment for the above is described. Test results are tabulated and discussed.

8490* Basic Forming Techniques For the Copper Base Alloys. Part III. Lester F. Spencer. *Tool Engineer*, v. 28, June 1952, p. 61-64.

Discusses cupping, redrawing, coining, stamping, embossing, cold heading, and similar operations. Also considers selection of tools and lubricants.

8491* Forming Tools For Magnesium Alloys. John Starr. *Tool Engineer*, v. 28, June 1952, p. 69-72.

Stamping dies with integral heating elements, developed at Consolidated Vultee Aircraft Corp. Diagrams and illustrations.

8492* Determination of Power and Output of Planers and Machine Tools. (In German.) Otto Kienzle. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Apr. 21, 1952, p. 299-305.

Proposes and describes a simple process for indicating the cutting speed, cutting strength, moment of rotation, and capacity of above machines. Problems and solutions for such calculations are included. Graphs and diagrams.

See also:
8450 (machining of ductile cast iron)
8464 (lubrication for stamping and deep drawing)
8570 (machinability of boron steels)
8593 (Russian machining practices)
8737 (deep drawing of mild steel)
9532 (new casting resin and use in metal forming)

6. POWDER METALLURGY

8493* Sintered-Iron Pieces. (In German.) G. F. Hüttig and A. Vidmajer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 365-376.

Factors which affect the density, specific electrical conductivity, hardness, and tensile strength of the above were investigated. Tables and graphs illustrate the effects of fineness of powder, compressive force, and sintering temperature. 14 ref.

8494* Production of Sponge Iron by Means of the Wiberg-Söderfors Process. (In German.) John Stalhed. *Stahl und Eisen*, v. 72, Apr. 24, 1952, p. 459-465; disc., p. 465-466.

Discusses present status of raw-materials situation in the Swedish iron and steel industry. Describes development of above process and the plant at Söderfors. Also deals with different methods for gas generation, the raw-materials balance, sulfur removal, reducing agents, requirements as to ores, economic factors, applications of sponge iron, and future plans. Diagrams, graphs, and tables.

8495* Hot Pressing Applications Increase. *Steel*, v. 130, May 26, 1952, p. 80-82, 84.

Briefly discusses the hot pressing of metal powder which generally follows one of two procedures, hot forging or hot molding. In the former, normally cold pressed and sintered parts are removed hot from the sintering furnace and subjected to a forging operation, usually in water-cooled steel dies. In the latter procedure, pressing and sintering are performed simultaneously in one operation. Describes improved technique for production of tungsten carbide pieces in a number of sizes and shapes, and briefly gives other applications of the process. Photographs.

See also:
8703 (joining sintered bodies to solid metals)
8959 (determining surface area of metal powders and compounds)

7. METALS—WELDING OR JOINING

8496 How to Weld Titanium. A. J. Rosenberg and E. F. Hutchinson. *American Machinist*, v. 96, May 26, 1952, p. 93-97.

Results of extensive tests made at G. E.'s Thomson Laboratory on 3 welding methods for 3 grades of Ti. Tables, micrographs, and macrographs. Mechanical properties of welds.

8497 Welding Study: Titanium and Titanium-Alloy Sheet. *American Machinist*, v. 96, May 26, 1952, p. 98-99.

Results reported include fatigue-strength data obtained by Chance-Vought Aircraft Div., United Aircraft Corp.

8498 Test Methods For Weldments. *American Machinist*, v. 96, May 26, 1952, p. 127, 129, 131.

Methods used in automotive industry. Describes deep-etch tests, guided-bend tests, shear tests for fillet welds, nick-break tests for butt welds, and size and contour measurement of fillet welds. Diagrams.

8499 Tests for Welding Materials. *American Machinist*, v. 96, June 9, 1952, p. 169, 171, 173.

Reference sheet describing following tests for steel, used in the automotive industry: arc-weld pad for chemical analysis; all-weld-metal tension test; hydrogen test for arc-weld deposits; moisture in welding electrode coatings; and usability test for AWS Class E-XX13 electrode. Tables and diagrams.

8500* Ceramic Backing for Tube Joints. Bela Ronay. *Journal of the American Society of Naval Engineers*, v. 64, May 1952, p. 359-369.

Considers primarily arc-weld joint design because root preparation, which includes the backing material, is directly related

to development of ceramic backing for tube welds. Schematic diagrams and illustrations.

8501 The Development of X-Ray Standards For Shielded Arc Welds in Aluminum. J. J. Hirschfield, D. T. O'Connor, J. J. Pierce, and D. Polansky. *ASTM Bulletin*, May 1952, p. 81-91.

A set of X-ray standards was established on the basis of guided-bend and tensile tests of 300 specimens. A book of film standards was prepared incorporating a summary of the test data. Standards are intended to apply to certain types of shielded-arc welding in 2S and 3S Al plate and particularly to mine-case welds. Tables, photographs, and x-radiographs.

8502* Investigation of Welds Between Stainless and Low-Carbon Steel. (In Russian.) N. Iu. Pal'chuk. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 1-4.

Chemical composition, mechanical strength, and corrosion resistance of various combinations of the above were investigated. Data are tabulated and illustrated.

8503* Automatic Welding of Pipelines by Rotary Butt Welding. (In Russian.) V. K. Ivanov. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 4-7.

Method and conditions for the above are discussed. Data are tabulated. Diagrams illustrate procedure.

8504* Influence of the Composition of Aluminum Alloys on Their Tendency Toward Formation of Cracks During Gas Welding. (In Russian). S. V. Avakian and N. F. Lashko. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 7-9.

Metallographic studies were made of the above. Results are discussed and illustrated.

8505* The Nature of Nonfusion During Spot Welding. (In Russian.) D. S. Balkovets. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 12-13.

A study was made of defective spot welds in various steels and nonferrous alloys. A test for lack of fusion using the electroconductivity of the weld is described. Illustrated.

8506* Electrodes for Building-up of Dies. (In Russian.) P. S. Turkin. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 13-16.

Discusses the conditions and compositions of the coatings required for low-alloy welding rods to be used for building-up drawing dies. Tables and graphs.

8507* Effect of Hygroscopic Moisture of the Coating on Certain Properties of Electrodes. (In Russian.) E. D. Lonskii. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 17-19.

A detailed study was made of moisture in various electrode coatings in relation to humidity and other atmospheric conditions. Tables and graphs.

8508* Contact Butt Welding of Tubes With Repeated Upsetting. (In Russian.) I. D. Davydenko. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 20.

The butt welding of carbon-steel boiler tubes is discussed and techniques for improving the quality of the welds are suggested.

8509* Measuring and Recording Welding Currents During Contact Welding. (In Russian.) A. A. Batovrin. *Avtogennoe Delo*, v. 22, Dec. 1951, p. 21-23.

Discusses problems of the above and describes equipment for obtaining the required data. Illustrated.

8510* New Method of Arc Welding Cast Iron. (In Russian.) K. K. Khrenov and F. S. Vol'fovskaia. *Avtogennoe Delo*, v. 23, Jan. 1952, p. 3-6.

Discusses the brazing of cast iron with Cu or Al bronzes. Includes results of bend tests and photomicrographs.

8511* Rectification of Current During Argon-Arc Welding. (In Russian.) *Avtogennoe Delo*, v. 23, Jan. 1952, p. 10-14.

Discusses the above with respect to the behavior of various metals as electrodes. Experimental data are charted.

8512* Flash Welding of Dissimilar Metals. (In Russian.) G. V. Nedzvetskii. *Avtogennoe Delo*, v. 23, Jan. 1952, p. 14-16.

Tests were made by flash welding steel to copper, steel to brass, copper to aluminum, and aluminum to brass. Structures of the welds are illustrated.

8513* The Use of Powdered Steel From Grinding Waste in Welding Electrodes. (In Russian.) V. G. Chernashkin and A. M. Gofner. *Avtogennoe Delo*, v. 23, Jan. 1952, p. 20-24.

Reclamation of steel powder from grinding waste and its use in electrode coatings is discussed. Experimental data from tests made with such electrodes are tabulated and charted.

8514* Influence of Gas Pressure Welding on the Quality of Welds. (In Russian.) S. M. Skorodzievskii. *Avtogennoe Delo*, v. 23, Jan. 1952, p. 24-26.

Bend tests were made on specimens taken from the top, bottom, and sides of butt-welded steel tubes. Data are charted and illustrated.

8515* Welding With Multi-Electrode "Bundles". (In Russian.) M. G. Golovintsev. *Avtogennoe Delo*, v. 23, Jan. 1952, p. 28-29.

Discusses use of the above in various industries.

8516* The Problem of Weldability of Metals. (In Russian.) S. V. Avakian and N. F. Lashko. *Avtogennoe Delo*, v. 23, Jan. 1952, p. 29-32.

Discusses the concepts of weldability of metals and considers various types of crystal structures of welds. Includes photomicrographs.

8517* Distribution of Heat Flow From Welding Flames and Its Influence on the Formation of Cracks During Heating of Thin Sheets of 30 KhGS (Chromansil) Steel. (In Russian.) N. N. Rykalin and M. Kh. Shorshorov. *Avtogennoe Delo*, v. 23, Feb. 1952, p. 3-7.

Discusses results of various directions of flame impingment on the above level. Experimental data are charted and illustrated.

8518* Automatic Welding of Brass to Steel. (In Russian.) N. A. Ol'shanskii. *Avtogennoe Delo*, v. 23, Feb. 1952, p. 7-10.

Discusses carbon-arc welding of brass to steel, riveting, and other means of fastening for guides, bearings, and similar articles as a way of saving significant quantities of nonferrous metals. Techniques are described and test data tabulated.

8519* Argon Arc Welding of Duralumin. (In Russian.) F. E. Tret'iakov. *Avtogennoe Delo*, v. 23, Feb. 1952, p. 10-13.

The above, using tungsten electrodes and various filler materials was investigated. Tensile, bend, and fatigue-test data are tabulated and charted.

8520* Weldability and the Tendency Toward Formation of Cracks During Welding. (In Russian.) Ia. S. Gintsburg. *Avtogennoe Delo*, v. 23, Feb. 1952, p. 28-29.

A general discussion.

8521* Deformation and Stresses During Welding of Hardenable Steels. (In Russian.) V. N. Zemzin. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 5-8.

Tests of the above were made using low-alloy Cr-Ni-Mo and plain-carbon steels. Mechanical properties and residual stresses after welding and various heat treatments were determined. Data are charted.

8522* Influence of Type of Electrode on the Distribution of Residual Stresses in Welded Joints. (In Russian.) P. A. Mel'nikov. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 9-12.

During welding of low- and high-alloy steels, the type of electrode was found to have a significant influence on the value and character of the residual stresses. Data are charted and illustrated.

8523* Investigation of Thermal Processes During Spot Welding by Use of Models. (In Russian.) D. S. Balkovets. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 13-16.

Discusses results of the above tests. X-shaped and V-shaped models were used. Both steel and Al were tested. Data are tabulated and charted.

8524* Electrodes With "BKZ" Coatings. (In Russian.) A. I. Kuzin. *Avtogennoe Delo*, v. 23, Mar. 1952, p. 24.

Composition of above coatings on ferromanganese electrodes are given. Results of mechanical tests of weld metal produced are tabulated and discussed.

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8525* Brazing Metal to Nonmetal. *Electrical Manufacturing*, v. 49, June 1952, p. 280, 282, 284, 286. (Condensed from "Metal to Nonmetallic Brazing", Library of Congress, Photoduplication Service, Publication Board Project, BP-106-109.)

Describes and illustrates new direct technique requiring no flux and using hydrides and alloys of Ti, Zr, Cb, and Ta. Method found applicable for diamonds, sapphires, carbides, ceramics, refractory oxides, glass, quartz, stainless steel, and Cr-Fe alloys.

8526* How to Reduce "Before and After" Welding Costs. Part I. Selecting Portable Air Grinders. *Industry & Welding*, v. 25, Apr. 1952, p. 48-50, 53.

(To be continued.)

8527* Low-Hydrogen Electrodes Now Used For Welding Armor Plate. R. J. Thomas, Jr. *Industry & Welding*, v. 25, June 1952, p. 48, 51, 69.

As a result of recent developments, it has been proven that electrodes of low-alloy steel containing 1½-2% Ni, 0.60-1.0% Mo, and 0.10-0.30% V will give stronger and tougher welds than those containing much higher amounts of critical alloys.

8528 The Interpretation of Weld Radiographs. C. Croxson. *Transactions of the Institute of Welding*, v. 15, Feb. 1952, p. 7-12.

An account of some factors to be considered in the above together with some examples, mainly of welds in steel not exceeding about 1 in. in thickness and made by various electric-arc processes. Radiographs and diagrams. 11 ref.

8529 Stress Distribution in Fillet Weld Connexions Between Rolled Angle Sections and Gusset Plates. F. Koenigsberger and H. W. Green. *Transactions of the Institute of Welding*, v. 15, Feb. 1952, p. 13-18.

A report of preliminary work on the above done to determine whether an advantage is gained by use of particular arrangement of welds. Concludes that, under static loading conditions, no advantage is gained by using particular arrangement and that practical considerations should decide design of the welds. 3-dimensional stress diagrams and graphs.

8530* Load Distribution in Riveted and Spot-Welded Joints. D. Williams. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 165, W. E. P. 66, 1951, p. 141-147; disc., p. 157-164.

A theoretical examination on the basis of experimentally obtained stress-strain curves for riveted and spot-welded joints in shear. Deals with the plastic, as well as the elastic, part of the stress-strain curves, and gives examples of the relative behavior of the 2 types of joint in certain simple structural elements. Diagram and graphs.

8531* Design Stresses in Fillet Weld Connexions. F. Koenigsberger. *Institution of Mechanical Engineers, Proceedings*, (Applied Mechanics Div.), v. 165, W. E. P. 66, 1951, p. 148-157; disc., p. 157-164.

Suggests a means of determining the working loads of eccentrically loaded fillet welded joints by working out the stresses in the plastic state prevailing immediately before failure occurs. Experimental results were in close agreement with calculated results. The 2 differing opinions on the best arrangement of fillet weld connections joining rolled angle sections to gusset plates were also investigated. Graphs, diagrams, and photographs.

8532* On the Relation Between Characteristics of A. C. Welders and Stability of Welding Arc. (In English.) Kohei Ando. *Japan Science Review*, v. 2, Apr. 1951, p. 59-62.

Discusses fundamental principles of the above. 13 ref.

8533* General Analysis of Welding Stresses and Their Applications. (In English.) Masaki Watanabe. *Japan Science Review*, v. 2, Aug. 1951, p. 139-146.

Mathematical analysis and graphical interpretation.

8534* Production Times for Manual Arc Welding. M. H. Wiegandt. *Machinery* (London), v. 80, May 22, 1952, p. 904-905.

Tables give production times which, it is believed, will be of considerable value to the time-study engineer. Compiled by taking averages of a large number of observations under actual working conditions in different ships, and over a considerable period of time.

8535 Strength Properties of Welds in 61S-T6 Aluminum Alloy Sheet. Louis Barrett. *Product Engineering*, v. 23, June 1952, p. 148-150.

Tensile strength of butt joints and shear strength of lap joints in Al-alloy sheet obtained with the Aircomatic inert-gas welding process where the filler wire is used for the electrode.

8536* Advances in the Field of Welding and Cutting; Status of Welding Technique in the Soviet Union. (Continued.) *Schweissen und Schneiden*, v. 4, Mar. 1952, p. 83-86; Apr. 1952, p. 125-127.

Reviews the literature on Russian welding research. 30 ref.

8537* Fatigue-Bending Strength of Girders. (In German.) A. Erker. *Schweissen und Schneiden*, v. 4, Apr. 1952, p. 112-115.

Tests on welded and unwelded rolled girders prove that welding always reduce the fatigue resistance of the steel. In designing steel structures, allowance must be given for the notch effect of weld seams. Diagrams and tables. 10 ref.

8538* Pressure Welding of Metals, Especially of Aluminum. (In German.) Werner Hummitzsch. *Schweisstechnik*, v. 6, Apr. 1952, p. 37-44.

Reviews pressure welding or cold welding on the basis of the literature. Describes particularly types of weldments; preparation of the surfaces to be welded; time, temperature and pressure required; and mechanical properties of the weldments. Diagrams, graphs, and micrographs.

8539 A Survey of Modern Theory on Welding and Weldability. D. Seferian. *Sheet Metal Industries*, v. 29, June 1952, p. 529-532, 540.

Presents details of calculations for acid and basic slags, as found in welding-electrode coatings. Graphs and tables. (To be continued.)

8540* Classification of Electrodes on the Basis of Their Welding Properties. (In German.) G. Westendorp. *Smit Mededelingen*, v. 7, Jan.-Mar. 1952, p. 19-22.

Discusses importance of a good system for the above. Author's opinion is that existing systems in use in various countries are inadequate to describe adequately all the properties necessary to make a practical choice for a given welding job. A new classification system is described.

8541* A New Electric Arc Welding Method: The "Plurial" Process. (In French.) M. Lebrun. *Soudure et Techniques connexes*, v. 6, Mar.-Apr. 1952, p. 55-63.

Describes above process which uses a bundle of electrodes, rather than a single one. Structural details are indicated, also time of fusion; advantages as compared to the usual method are outlined. Data are tabulated.

8542* Glass Tape Backs Up Welds For Jet Ejector. L. R. Constantine. *Welding Engineer*, v. 37, June, 1952, p. 36-37.

Tells how to insure sound welds when only one side of the seam can be welded by use of back-up tape of the same analysis as the submerged-arc flux. Metal welded is carbon steel.

8543* Welding Heat Exchangers For the Chemical Industry. John W. Mortimer. *Welding Journal*, v. 31, May 1952, p. 387-392.

Different types of heat exchangers and fabrication procedures for their manufacturers. Emphasis on welding, but includes choice of alloys for different parts and service conditions, inspection, testing, and finishing. Numerous illustrations.

8544* Metal Transfer in Sigma Welding. R. T. Breymeier. *Welding Journal*, v. 31, May 1952, p. 393-399.

Above was studied by ultraslow-motion photography, and effect of different welding conditions, current, gas mixtures, and rod material noted. Detailed information on experimental results with carbon and stainless steel and with aluminum. Effects of current direction and amperage, and gas, on surface appear-

ance of beads, are illustrated extensively. Their effects on rate of consumption of electrode wire and on voltage recorded are charted. Compares results with pure argon and with Linde's sigma grade (oxygen plus argon.)

8545* Effects of Nose Design on Spot Welding Electrodes. E. F. Holt and L. W. Sink. *Welding Journal*, v. 31, May 1952, p. 400-406.

Performance of 9 standard designs of spot-welding electrodes in terms of weld quality and electrode life. Each design was tested under two sets of closely controlled conditions by making 10,000 spot welds on two thicknesses of half-hard, cold-rolled, mild steel. Appearance of welds and of test electrodes is illustrated. Graphs and tables.

8546* Welding Characteristics of Materials for Aircraft Gas Turbines. A. J. Rosenberg. *Welding Journal*, v. 31, May 1952, p. 407-413.

Presents results of a welding program on high-temperature sheet materials. Those evaluated include austenitic stainless steels, age-hardenable high-Ni alloys (Inconels), Haynes Stellite alloys, low-alloy high-tensile steels, and Ti and its alloys. Micrographs and macrographs.

8547* Dilution and Diffusion Aspects of Nonfusion Welding. *Welding Journal*, v. 31, May 1952, p. 413-414.

Discussion by H. Udin of above paper by R. D. Wasserman and J. Quaas (Dec. 1951 issue). Includes authors' reply.

8548* Silver-Brazing Jobs. K. R. Shepard. *Welding Journal*, v. 31, May 1952, p. 424-425.

Diagrams show poor and good joint designs. Table shows properties of several silver-brazing alloys. Recommended procedures for Cu tubing, food containers, and dairy equipment (Monel or stainless.)

8549* Surface Tension and the Joining of Metals. E. R. Funk and H. Udin. *Welding Journal*, v. 31, May 1952, p. 247s-252s.

Requirements of surface tension for design of brazing alloys are pointed out and discussed with reference to some industrially significant systems. Schematic diagrams. 17 ref.

8550* Heat Flow in Welding. A. A. Wells. *Welding Journal*, v. 31, May 1952, p. 263s-267s.

Tells how heat-dissipation calculations can be used for predicting size of weld and how inspection of ripples on finished welds indicates heat input used. Describes theory and experimental verification for single-pass arc-butt welding of mild-steel plate. Graphs.

8551* Melting Rate of Coated Electrodes. J. ter Berg and A. Larigaldie. *Welding Journal*, v. 31, May 1952, p. 268s-271s.

Factors affecting the above are considered and discussed in detail. Describes experimental equipment and results. Tables and graphs.

8552* Correlation of Weldability Tests With Structural Joints. Part I. Investigations With Tests of the Restrained Fillet Type. C. L. M. Cottrell. *Welding Research*, v. 6, Feb. 1952, p. 2r-12r.

Effect of rate of cooling on the initiation of hard-zone cracking was studied in an attempt to provide a scientific basis for the above. Chief material used was a low-alloy Mn-Mo steel. Tables, diagrams, graphs, and photographs. (To be continued.)

8553* The Weldability and Weld Strength of Some Magnesium Alloy Sheet Materials. J. G. Ball. *Welding Research*, v. 6, Feb. 1952, p. 13r-26r.

Above were determined for oxyacetylene and argonarc hand welding. Alloying elements were: Al, Zn, Mn, Ca, Ce, and Zr. Tables, diagrams, and micrographs.

8554* A New Double-Fillet Test for Hot-Cracking. E. G. P. Hinds. *Welding Research*, v. 6, Feb. 1952, p. 27r-28r.

Describes above, much more severe than the T-test, which it is intended to replace. The material is mild-steel plate. Diagrams and table.

8555* Experiments on the Cold Pressure Welding of Metals. (In German.) Wilhelm Hofmann and Jürgen Ruge. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 133-137.

Describes experiments on the above. Dependence of tensile strength of the welds upon the materials welded, degree of deformation, and welding temperature is indicated. Application of the method to butt welds is discussed. Tables, charts, and micrographs.

8556* Fluxing Agents for Soft Soldering. (In German.) C. G. Keel and G. B. Brubacher. *Zeitschrift für Schweisstechnik, Journal de la Soudure*, v. 42, May 1952, p. 95-101.

Reviews recent patent literature concerning the more important fluxing agents developed up to 1950. Table gives chemical composition, properties, applications, and references (mostly patents), for 37 different types.

Books

8557 Voprosy Teorii Kontaktnoi Svarki. (Problems in the Theory of Contact Welding.) K. A. Kochergin. 103 pages. 1950. Government Scientific-Technical Publishing House for Machine-Industry Literature, Moscow and Leningrad, U.S.S.R. (TS227 K81v)

Reviews the basic electrothermal problems of the most frequently used processes of contact welding of steel. Methods for determination of optimum conditions of operation for each method are indicated. 22 ref.

8558 The Welding of Non-Ferrous Metals. E. G. West. 553 pages. 1951. John Wiley & Sons, New York. (TS227 W52w)

The book has been written with two main classes of reader in view; the welding engineer, welding operator, welding instructor, and trainee on one hand; and the designer, plant engineer, and metallurgist on the other. There is no attempt to describe in detail all the various welding processes. Brief descriptions of the processes and equipment are included. Chapters on weldability, properties important in welding, and on fusion welding are followed by 9 chapters, each devoted to welding a specific group of nonferrous metals and alloys. Tables, graphs, diagrams, illustrations, and 353 ref.

8559 Welding: Productivity Report. 74 pages. Aug. 1951. Anglo-American Council on Productivity, London and New York. (TS227 An46w)

Report was prepared by a team of British specialists which visited the U. S. in 1950. Covers mechanical handling, materials for welding, welding processes and equipment, inspection and testing, working conditions, costs and productivity, and welding in a number of specific industries. Gives recommendations for British industry.

See also:
8665 (low-temperature properties of soldered joints)
8756 (load tests on welded steel)
8934 (a welded-tank failure)

8. METALS—THERMAL TREATMENT

8560* Influence of Size, Preliminary Treatment, and Hardening Agents on the Hardening of Unalloyed Tool Steels. (In German.) Erich Theis. *Archiv für das Eisenhüttenwesen*, v. 23, Mar./Apr. 1952, p. 113-118; disc., p. 118.

Above was investigated for toolsteels containing 0.6-1.0% C, 0.2-0.6% Mn, and 0.1-0.2% Cr. Influence of the various factors is indicated; and optimum size and treatment for test pieces are suggested. Data are extensively charted.

8561* The Influence of Heat Treatment on the Strength Characteristics and the Structure of Steel Wire. J. Billigmann. *Draht* (Wire) (English Ed.), Dec. 1951, p. 28-33.

The most suitable heat-treatment conditions for steel wires of low, medium and high carbon contents to obtain suitable strength properties and favorable structures are described. Graphs, tables, and micrographs.

8562* Induction Hardening of Malleable Iron. (In German.) A. Rühenbeck. *Giesserei*, v. 39, Mar. 6, 1952, p. 103-107.

Briefly discusses advantages and characteristics of above. Graphs, tables, macrographs, and micrographs.

8. *Metals—Thermal Treatment*

8563 How to Case Harden Steel by Nitriding. John L. Everhart. *Materials & Methods,* v. 35, May 1952, p. 90-93.

The process, choice of steel, influencing factors, mechanical properties of the product, and applications. 10 ref.

8564 Precipitation Hardening Stainless Steels Show Advantages Over Standard Grades. Gordon T. Bedford. *Materials & Methods,* v. 35, May 1952, p. 99-104.

Properties of Armco 17-7 PH and 17-4 PH steels which can be readily cold or hot worked and welded, and with proper heat treatment, develop strengths equalling those of the carbon and low-alloy steels at room temperature. Miscellaneous physical, mechanical, and fabrication properties. Heat-treatment and welding-sequence effects. Extensive tabular data.

8565 Heat Treatment Plant Developments: Recent Installations for Ferrous and Non-Ferrous Metals. *Metallurgia,* v. 45, May 1952, p. 231-245.

An illustrated survey of above covering: reheating furnaces, annealing furnaces, annealing of malleable castings, hardening and tempering furnaces, gas-carburizing equipment, salt baths, and exfoliation of vermiculite.

8566* Thermal Treatment of Metals; Application of Salt Baths. (In French.) *Métallurgie et la Construction mécanique,* v. 84, May 1952, p. 321, 323, 325-326.

Reviews recent progress in the above, as applied to steels. Tables give extensive data concerning salt-bath compositions for different heat treatments and different steels. Heat-treatment cycles are also tabulated.

8567 Isothermal-Transformation Tempering. *Metal Treatment and Drop Forging,* v. 9, May 1952, p. 204. (Translated and condensed from article by E. Theis, *Stahl und Eisen,* Dec. 20, 1951, p. 1433-1440.)

A study in which various alloy steels were subjected to an austempering treatment immediately after hot working. Discusses conditions necessary to obtain a spheroidized cementite structure.

8568* New Electron Diffraction Studies of the Carburizing of Iron. (In French.) Jean-Jacques Trillat and Shigeo Oketani. *Revue de Métallurgie,* Apr. 1952, p. 262-266; disc., p. 266.

Describes a technique consisting of vacuum deposition of very thin films of Fe on a support of NaCl; the support is dissolved in water and the film of Fe is subjected to carburizing in the presence of CO or a $CO+H_2$ mixture. The films are examined by electron diffraction, making it possible to study the kinetics of surface reactions which accompany carburization and to identify different phases formed. Diffraction patterns, diagrams, and tables.

8569* Protective Gases for the Heat-Treatment of Steels. (In German.) Ernst Kunze. *Stahl und Eisen,* v. 72, May 8, 1952, p. 561-569.

Survey of literature relating to the physical-chemical fundamentals, types, industrial production, and application of protective gases. Use of $C\text{-}O_2\text{-}H_2$ diagram for assessing suitability of protective gases for certain steels. Tables, graphs, and diagrams.

8570 Heat Treating Boron Steels; Machinability Can Be Improved. J. D. Graham. *Steel,* v. 130, May 12, 1952, p. 94-96.

Discusses heat treatment, hardness, and microstructure as they apply to machinability. Graphs showing transformation, hardenability range.

8571 Practical Aspects of Tool and Die Heat Treatment. Edward J. Pavesic. *Steel Processing,* v. 38, May 1952, p. 240-243.

A discussion to aid the tool engineer. Covers such aspects as selection of material, tool design, and heat-treating practice.

8572* Preheat Vs. Low- and High-Temperature Stress-Relief Treatments. E. Paul DeGarmo. *Welding Journal,* v. 31, May 1952, p. 233s-237s.

Bend-test results on large carbon-steel-plate specimens designed to give a direct comparison of preheat, low-temperature stress-relief, and postwelding heat treatment at 1200°F. Graphs, micrographs, and macrographs.

Books

8573 Elements of Hardenability. M. A. Grossmann. 164 pages. 1952. American Society for Metals, Cleveland, Ohio. (TA407 G91e)

Hardenability in its older era was on a qualitative basis, in which effects were described as large or small, strong or weak. Now the emphasis is on quantitative data. This book deals with such aspects and the principles underlying them in so far as such principles are now discernible. Consists of 4 chapters: Hardenability Tests; The Nature of Hardening; Nature of the Quenching Process; Effects of Alloying Elements on Hardenability.

See also:
8430 (annealing vs. sand removal from castings)
8452 (heat treatment of steel castings)
8465 (tinplate annealing—British plant)
8737 (heat-treatment effects on mild steel)
8756 (heat treatment of steel welds)
8757 (quench aging vs. notch sensitivity of steel)
8782 (heat treatment of stainless-steel tubes)
8801 (heat treatment of spring steels)
9021 (spring materials—heat treatment)

9. CLEANING, FINISHING, AND COATINGS—METALLIC

8574* The Structure of Films of Copper Obtained by Electrodeposition on a Monocrystal of Electropolished β-Brass. (In French.) Noboru Takahashi. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 16, 1952, p. 1619-1621.

Information on the above. Includes electron micrographs.

8575* Utilization of a Filament of Tungsten as a Support for the Silver Coating of Surfaces by Evaporation in a Vacuum. (In French.) Jean Roig and Émilienne Collet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 21, 1952, p. 1677-1680.

Good adherence of globules of melted Ag to W was obtained after subjecting the latter to an electrolytic treatment. Compares results with those using a Ta support.

8576* Influence of Electrical Field on the Formation of Thin Films. (In French.) Marcel Perrot and Jean-Pierre David. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 28, 1952, p. 1753-1755.

Effects of electrical field on vacuum deposition of thin films of Ag and Al were studied. Variations in resistivity of the films with applied field during the deposition process are described. Data are charted and discussed.

8577* The Thermal Formation of Thin Films of Gold and A. Fery's Transformation Points. (In French.) Antoine Colombani and Gaston Ranc. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 28, 1952, p. 1757-1759.

André Féry showed that, upon heating a thin film of Pt black obtained by cathodic sputtering in dry air, during deposition of the Pt film, a discontinuous transformation with 7 "breaks" at different temperatures takes place, shown by variation in electrical resistivity of the deposits. A similar investigation was made for Au, using vacuum deposition on a silica base. Films between 2000 and 10,000 A. in thickness were studied. Apparatus is diagrammed; results are charted and discussed.

8578* Some Aspects of Anodising. K. H. Belcher. *Australasian Engineer,* Mar. 7, 1952, p. 66-71.

A discussion dealing with: mechanism; composition and structure; classification; factors affecting production; comparison of main processes; and effect of alloy constituents. Diagrams and tables. 27 ref.

8579 Ceramics for Jet Use Put Into Production. *Aviation Week,* v. 56, June 9, 1952, p. 30, 32, 35, 37.

Describes and illustrates some operations at the Bettinger Corp.

plant, Waltham, Mass., claimed to be first in U. S. devoted exclusively to production of high-temperature ceramic coatings of metal.

8580 Hydrogen as an Additional Reducing Agent to Coke in the Blast Furnace. J. L. Boyle. *Blast Furnace and Steel Plant*, v. 40, May 1952, p. 535-537.

Suggests use of H_2, either pure or mixed with hydrocarbons in coke-oven gas, as an additional reducing agent besides coke. Reduction in coke consumption might be achieved. Theory and probable effects are discussed. Shows that the suggestion is not in conflict with the present trend toward oxygen enrichment.

8581 Gasoline Resistant Tank Coatings. W. W. Cranmer. *Corrosion* (Technical Section), v. 8, June 1952, p. 195-204.

Discusses the above paint problem; also that of coating underground, concrete, gasoline-storage tanks. Surface preparation, ventilation, safety precautions and costs are also considered. Methods other than coatings were investigated. Numerous photographs.

8582* Sprayed Aluminium Coatings for the Protection of Steel. T. P. Hoar. *Electroplating and Metal Finishing*, v. 5, May 1952, p. 171, 173-174.

Comparison of wire and powder spraying of Al; discusses electrochemical relationships of Al, Zn, and steel; composite Al-Zn coatings; sprayed coatings as basis for paint; and modification of sprayed Al coatings by heat treatment.

8583 A Hydride Bath for the Electrodeposition of Aluminum. Dwight E. Couch and Abner Brenner. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 234-244.

Discusses process developed for deposition of Al from an ethereal solution of $AlCl_3$ and a metal hydride. An investigation was made of the effect of various inorganic addition-agents on the type of deposit produced from the fused $AlBr_3$-KBr bath. 32 ref.

8584 The Electrolytic Polishing of Lead-Tin Alloys for Microscopic Examination. A. W. Moulen. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 133C-136C.

Describes technique for the electrolytic polishing of Pb, Sn and their alloys, which produces polished and etched specimens without laborious initial grinding and surface preparation, at the same time avoiding the handling of potentially explosive chemicals. Photomicrographs.

8585 The Mechanism of the Tungsten Alloy Plating Process. Walter E. Clark and M. H. Lietzke. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 245-249.

The mechanism postulated for the plating of tungsten alloys includes: deposition of a film of partly reduced tungstate on the cathode and catalytic reduction of this film by H_2 in the presence of freshly deposited Fe, Co, or Ni. 27 ref.

8586* The Influence of the Wave Forms of Rectified Alternating Current on the Growth of Galvanic Deposits. M. E. Beckmann and F. Maass-Graefe. *Engineers' Digest*, v. 13, Apr. 1952, p. 115-116. (Translated and condensed from *Metalloberfläche*, ser. A, v. 5, Nov. 1951, p. A161-A169.)

Previously abstracted from original.

8587 From Pickle Plant to Inspection. J. Eccleston. *Foundry Trade Journal*, v. 92, May 1, 1952, p. 473-475, 482.

Describes several new ideas and suggestions on sheet- and cast-iron enameling. Covers pickling, inspection, cover-coat enameling, titanium opacification, mottling, and sieving.

8588 The Electrochemistry of Nickel. W. A. Wesley. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 957-965.

Present knowledge, both scientific and practical, of the electrochemical reactions of Ni as they find application in industry today, is reviewed. Evidence is cited to show that it is possible to electrodeposit sound Ni metal at speeds much higher than have yet been employed commercially. Industrial processes discussed include electrorefining, electroforming, electroplating, resizing of mismachined parts, and electropolishing. 20 ref.

8589 Metal Spraying Technique as Applied to Protection. W. E. Ballard. *Transactions of the Institute of Welding*, v. 15, Feb. 1952, p. 19-22.

Describes above technique, dealing with the wire process. Steel, Al, and Zn are mentioned. Micrograph, photographs, and cross-section deposit diagrams.

8590 The Use of Metal Spraying for the Protection of Structural Steelwork. V. E. Stanbridge. *Transactions of the Institute of Welding*, v. 15, Feb. 1952, p. 23-25, 30.

Describes above, first discussing factors affecting choice of metal spraying vs. other anti-corrosive treatments. Includes an account of preparatory cleaning methods, and joining methods in relation to metal spraying. The metal sprayed was Al. Tables and photographs.

8591 Metal Spraying as a Building-Up Process. A Brief Survey of Techniques, Characteristics and Applications. J. Barrington Stiles. *Transactions of the Institute of Welding*, v. 15, Feb. 1952, p. 26-30.

Chiefly discusses the manner and adequacy of the bond; cohesion of particles forming the coating; and when to use the method. Photographs, micrographs, and diagrams.

8592 Salvage of Worn Machinery by Metal Spray. G. A. Onion. *Transactions of the Institute of Welding*, v. 15, Feb. 1952, p. 31-32.

Describes experiences in above operation covering surface preparation; nature of wear and metal to be used; corrosive conditions; and economics.

8593 Russian Tractors Show Sound Engineering. W. G. Patton. *Iron Age*, v. 169, June 5, 1952, p. 150-152. (Condensed from Russ Packs Engineering Punch, J. M. Davies, *SAE Journal*, v. 60, June 1952, p. 17-21.

A report on Russian metalworking based on 2 captured Stalinetz 80 tractors. Discusses heat treating, casting, and machining practices. Photographs.

8594 Complex Parts Easily Coated With Aluminum. W. G. Patton. *Iron Age*, v. 169, June 12, 1952, p. 115-118.

Describes new method developed by General Motors for imparting heat and corrosion resistance to fabricated steel parts by dipping them in an Al bath. Photographs and diagrams.

8595 Chemical and Anodic Treatments. (Continued.) V. F. Henley. *Light Metals*, v. 15, May 1952, p. 147-148.

A British patent review covering those published since 1946. Appraises their potential or known usefulness. (To be continued.)

8596* Electroplating Process With a Leveling Effect. (In Dutch.) A. Dias Santilhano. *Metalen*, v. 7, Mar. 28, 1952, p. 99-106.

Discusses significance and possibilities of leveling baths in contrast to bright baths. Various technical and chemical aspects, and savings affected by this process, are indicated. Micrographs, tables, schematic diagrams.

8597* Chromium Plating Baths Containing Fluorides or Fluosilicates. T. A. Hood. *Metal Finishing*, v. 50, June 1952, p. 103-106, 112.

Discusses advantages over conventional H_2SO_4 bath, the most important being faster plating speed. Also considers disadvantages. 20 ref.

8598* Some Notes on Hard-Coating Aluminum. Herbert E. Horn. *Metal Finishing*, v. 50, June 1952, p. 110-112.

Describes application of a hard oxide coating. Considers hardness of the coating; lack of warping during process; resistance to corrosion; heat resistance; operation of the process; alloys for coating; and applications. 20 ref.

8599* Radiometric Study of Phosphating Problems. Stanley L. Eisler and Paul G. Chamberlain. *Metal Finishing*, v. 50, June 1952, p. 113-116.

A number of problems pertaining to phosphating of steel were investigated. Results indicated that Fe from the solution becomes an integral part of the phosphate coating; residual phosphate is present on work after grit or sandblasting; and re-phosphating after grit or sandblasting results in a lower process

9. *Cleaning, Finishing, and Coatings—Metallic*

efficiency than after chemical removal of the original coating. Tables.

8600 The Vacuum Coating of Metal Articles. L. Holland. *Metal Industry*, v. 80, May 2, 1952, p. 351-354.

Concerns some problems of the lacquering technique associated with the above: properties required of lacquer coatings; influence of base-metal surface-finish on quality of evaporated coatings; vacuum-coating properties of several commercial lacquers used as base coatings on metals; and tinting of evaporated Al films by dyeing the lacquer protective coating.

8601 Pickling, Phosphating and Priming of Structural Steel. *Metallurgia*, v. 45, May 1952, p. 253-254.

Describes above anti-corrosion treatment at Appleby-Frodingham Steel Co. The Footner process is used.

8602 Organic Coatings for Metallizing. Robert B. Stanton. *Organic Finishing*, v. 13, May 1952, p. 18-19.

Consists of using clear lacquer or a similar resinous medium, in which metal powders are dispersed as pigments, to coat a metallic or nonmetallic surface.

8603 Some Characteristics of Zinc Cyanide Plating Solutions. III. Limiting Anode Current Density and Solution Resistivity. Gustaf Soderberg. *Plating*, v. 39, Apr. 1952, p. 377-379.

Three-dimensional graphs show limiting anode current densities in Zn solutions, and resistivity of Zn solutions at 77°F. (To be concluded.)

8604 The Preparation of Tinplate for Painting. S. C. Britton. *Sheet Metal Industries*, v. 29, June 1952, p. 545-548, 558.

Describes experimental evaluation of various methods for the above. Results of scratch tests on painted surfaces following different pretreatments are tabulated and illustrated.

8605 Accelerated Phosphate Coating Fits High Speed Finishing Setups. Norman Kuperschmid. *Steel*, v. 130, May 12, 1952, p. 92-93.

Rapid chemical process coats Zn and Cd parts in 30 sec. to 1 min. Ferrous surfaces are treated in 2-5 min. Application is simple.

8606* Formation of Coating Films and of Protective Layers. (In German.) Ludwig Werner Haase. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 198-205.

The concepts of coating films and protective layers are defined, and the various types and their chemical and electrochemical effects discussed. On the basis of numerous practical examples, factors influencing the formation of films are given.

8607 Coating Metal Used in Hot-Dip Galvanizing. Part II. Wallace G. Imhoff. *Wire and Wire Products*, v. 27, May 1952, p. 469-472.

Discusses impurities generally found in Zn slab—Fe, Pb, and Cd, their beneficial and detrimental effects, and possible methods of elimination. (To be continued.)

8608 A New Coating Process for Mechanically-Descaled Patented High Carbon Wire. Part I. *Wire and Wire Products*, v. 27, May 1952, p. 473-475.

Describes experimental work and factors which led to development of above process. (To be continued.)

8609* Anodic Polishing of Brass and Copper. (In German.) Horst Muhlberger. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 142-146.

Describes various experimental conditions which effect anodic polishing, particularly importance of the viscous layer, and influence of bath agitation. Optimum plant arrangements and production data are cited. Micrographs, graphs, and diagram.

Miscellaneous Publications

8610 Throwing Power and Covering Power in Electroplating Solutions. W. de Bruijn. *Journal of the Electrodepositors' Technical Society*, v. 27, 1951, p. 1-9; disc., p. 9-11. (Preprint.) (TS670 E25j)

Discusses fundamental principles. Gives practical conclusions.

8611 Recent Developments in Tin and Tin Alloy Plating. J. W. Cuthbertson. *Journal of the Electrodepositors' Technical Society*, v. 27, 1951, p. 13-20; disc., p. 21-22. (Preprint.) (TS670 E25j)

8612 Influence of Cathode Material on the Electrodeposition of Metals. (In French.) R. Piontelli and C. Guerci. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 149-158; disc., p. 159. (QC311 C73c)

Discusses the energetic and kinetic aspects of the influence of the nature, conditions of preparation, and surface state of the cathode material in the deposition of metals. Micrographs. 18 ref.

8613 Application of Cathodic Current to Metal Surfaces an an Indicator of the Oxide Coating, the Hydrogen Charge, and the Concentration of Dissolved Oxygen. (In German.) F. Tödt. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 232-239. (QC311 C73c)

Describes experiments on the above on a Pt cathode connected to a nonpolarized anode. Tables and graphs. 10 ref.

8614 The Dynamic Behavior of a Cell for Electropolishing of Copper. (In French.) L. Meunier. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 242-252. (QC311 C73c)

Discusses above, using aqueous solutions of orthophosphoric acid, with respect to transitory phenomena at the beginning of the process, anodic oscillations, and short circuiting after polishing. Includes graphs. 12 ref.

See also:
8402 (effect of manufacture and fabrication of steel on electroplating)
8451 (finishing Al venetian blinds)
8465 (tinplate manufacture—British plant)
8669 (zincification of iron)
8694 (electrochemical processes on metal surfaces)
8749 (mechanical and electropolishing vs. hardness)
8754 (Cr plating vs. fatigue strength of alloy steel)
8772 (anodic coatings on Al alloys)
8791 (corrosion-preventive coatings on packaging)
8798 (sonic and ultrasonic vibration vs. electrochemical processes)
9020 (plating of steel wire before drawing)
9593 (Zn in paints for steel)

10. METALLOGRAPHY AND PRIMARY STRUCTURES

8615* The Appearance of Preferred Orientation (112) in Plastically Deformed and Recrystallized Copper. (In French.) Paul Bastien and Jean Pokorny. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 1952, p. 1780-1782.

Results of investigation of the above are presented and compared with those of other investigators. Illustrated.

8616* The Structure of the σ Phase in Vanadium-Nickel Alloys. (In English.) W. B. Pearson and J. W. Christian. *Acta Crystallographica*, v. 5, Mar. 1952, p. 157-162.

Above was investigated by single-crystal and powder-photograph methods. Structure factors obtained from Cu oscillation photographs and Cu and Cr powder photographs are compared with those calculated from the atomic positions given by Tucker for β-uranium; and by Kasper, Cekcer, and Belanger for the Co-Cr σ-phase.

8617* The Crystal Structure of Ti_3Au and Ti_3Pt. (In English.) Pol Duwez and Charles B. Jordan. *Acta Crystallographica*, v. 5, Mar. 1952, p. 213-214.

Powder patterns indicate that Ti_3Au and Ti_3Pt crystallize in the A-15 (β-wolfram) structure with lattice parameters of 5.096 and 5.033 A, respectively.

8618* Developments in Silicon Carbide Research. (In English.) L. S. Ramsdell and J. A. Kohn. *Acta Crystallographica*, v. 5, Mar. 1952, p. 215-224.

An additional 5 new types of SiC are described, and their unit-cell dimensions and atomic arrangements given. In order to explain the large number of polymorphs of SiC (now 14 fully-described types), it is postulated that, in the growth of SiC by sublimation, there are formed certain clusters of atoms (polymers), each characterized by a particular temperature stability range. At a given characteristic temperature, a single type of polymer would produce a "pure" type, with the sequence consisting of identical pairs. If stability ranges overlap, two polymers might exist simultaneously, resulting in a "mixed" type. Variations in the proportions of the two polymers present would produce types composed of the same polymers, but in differing proportions.

8619* The Crystal Structure of β-Monoclinic Selenium. (In English.) Robinson D. Burbank. *Acta Crystallographica*, v. 5, Mar. 1952, p. 236-246.

Above was determined by application of Harker-Kasper phase inequalities and two-dimensional Fourier syntheses. Diffraction data demonstrate that a single crystal of β-Se can transform directly into metallic Se. During the transition, the molecules are broken down into smaller fragments which recombine to form the infinitely long helical chains of metallic Se. Relations between mixed crystals of S and Se, and between the various polymorphs of Se, are discussed. 21 ref.

8620* The Crystal Structure of the Cadmium-Magnesium Alloy, CdMg. (In English.) H. Steeple. *Acta Crystallographica*, v. 5, Mar. 1952, p. 247-249.

Above was determined accurately. Unit-cell dimensions are given, also atomic-scattering factors for both Cd and Mg at room temperature.

8621* The Surface-Active Components of Steel. (In Russian.) S. M. Baranov. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 125-128.

The influence of silicates with high and low contents of Si on the microstructure and crystal structure of low-alloy structural steels is discussed. Includes photomicrographs.

8622* The Al-Cu-Mg System. (In Russian.) G. G. Urazov and M. S. Mirgalovskaia. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 247-250.

A study was made of the phases of the above system. A new ternary composition diagram was prepared. Three sections of the new diagram are illustrated.

8623 Nodules and Nuclei in Nodular Cast-Iron. Part II. (Concluded.) J. E. Rehder. *American Foundryman*, v. 21, May 1952, p. 87-90.

Concluding article contains details of size distribution, chemical analysis, and X-ray diffraction studies at Canadian Department of Mines & Technical Surveys.

8624* The Iron-Phosphorus-Antimony Phase Diagram. (In German.) Rudolph Vogel and Dietrich Horstmann. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 127-134.

The above system was investigated as to structure and thermal behavior. Reports on a process which makes it possible, by adding Cu, to determine metallographically and chemically the saturation content of P in molten Sb. Presents a complete phase diagram of above systems, deducing the conditions for a second ternary boiling point. Graphs, diagrams, and micrographs.

8625* The Top-Illumination, Phase-Contrast Microscope and Its Use in Metallography. (In German.) Erich Witten. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 145-150.

Describes above type of microscope with a new top-illumination, phase-contrast set-up. Examples of application are described and illustrated.

8626 Electron Microstructure of Bainite in Steel. *ASTM Bulletin*, May 1952, p. 62-65. (A condensation. To be published in full in preprint of Report of ASTM Committee E-4 on Metallography.)

A study of the isothermal transformation products formed within the bainite range between 500 and 950°F. The steel used included in its composition: Ni, 0.39%; and Cr, 0.21%. Table and electron micrographs.

8627* Laminated Structure. (In French.) M. Remy. *Circulaire d'Informations Techniques*, v. 9, May 1952, p. 682-698.

Describes the band structure of various types of steel, such as Cr-Mo (18-CD4), Cr-Ni (16-NC-11), and Cr-Ni-Mo (30-NCD-16). Various examples of such structure are examined, factors influencing its formation are outlined. Relationship between structure and mechanical properties is indicated. Micrographs. 18 ref.

8628* How Can We Obtain Good Micropictures by High Scattering? Some Optical Points of View. (In Swedish.) Sten Modin and L. E. Eriksson. *Jernkontorets Annaler*, v. 136, no. 1, 1952, p. 1-8.

Five different lenses of high resolving power were investigated with respect to their performance in obtaining micrographs of metallic surfaces, both photographically and visually. The experiments were made without filters, as well as with yellow, green, and blue filters. The light transmission of several immersion oils was investigated. Results are discussed. Tables, charts, and micrographs.

8629 Titanium-Aluminum System. E. S. Bumps, H. D. Kessler, and M. Hansen. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 609-614.

The Ti-rich end of the Ti-Al phase diagram was determined to the compound $TiAl_3$ (62.7% Al). Micrographic analysis and X-ray diffraction were the chief methods used. 10 ref.

8630 Partial Titanium-Vanadium Phase Diagram. Paul Pietrokowsky and Pol Duwez. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 627-630.

Gives details of preparation of alloys and of experimental procedure. Results led to establishment of the constitution diagram between 980 and 650°C. Typical microstructures are presented, also graphical data.

8631 Crystal Structure of ZrB_{12}. Benjamin Post and Frank W. Glaser. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 631-632.

The above was investigated, using powder diffraction. Graph and diagram.

8632 Crystallographic Angles for Titanium and Zirconium. Carl J. McHargue. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 660.

Above were calculated. They are tabulated and shown graphically.

8633* Use of the Electron Microscope in the Investigation of Metal Surfaces. I. Progress in Preparation Techniques. (In Dutch.) V. Ch. Dalitz and J. A. Schuchmann. *Metalen*, May 15, 1952, p. 153-161.

A convenient and rapid method for getting useful positive replicas from metal surfaces is described. An etched metal is placed in a high-vacuum bell jar and a thick layer of silver is deposited upon it by evaporation from a small crucible. This layer can easily be removed from various metals. The negative silver replica is coated with a thin film of SiO in vacuum. A still better positive replica result upon polymerization of a hydrocarbon upon the silver in a glow discharge. The silver is dissolved in HNO_3 and a shadow is applied.

8634* The Electron Microscope and Metallography. Part II. Applications to Metallography. (In French.) A. Septier and M. Gauzit. *Métallurgie et la Construction méchanique*, v. 84, Mar. 1952, p. 241, 243, 245, 247, 249.

Discusses use of emission, reflection, and transmission microscopes for study of surface finishes, corrosion phenomena, structural aging, and mechanical treatment and heat treatment of steels. Includes micrographs.

10. *Metallography and Primary Structures*

8635* The Palladium-Mercury System. (In German.) H. Bittner and H. Nowotny. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, no. 2, 1952, p. 287-289.

Brief discussion of preparation and properties of several Pd amalgams (11.2-34.8% Pd). Includes tabulated results of X-ray diffraction studies.

8636* Growth Spirals Originating From Screw Dislocations on Gold Crystals. S. Amelinckx. *Philosophical Magazine,* ser. 7, v. 43, May 1952, p. 562-567.

A detailed account of the observation of growth spirals on faces of gold crystals obtained by precipitation. The observations prove that Frank's theory also holds for metal crystals; moreover they constitute the first visual proof for the presence in metal crystals of dislocations in general, and screw dislocations in particular. They further show that the Burgers vector of dislocations in metals is not necessarily limited to one unit of a few simple lattice displacements, as is generally assumed. Diagrams. 16 ref.

8637 Nuclear Resonance and the Electronic Structure of Transition Metals. W. D. Knight and C. Kittel. *Physical Review,* ser. 2, v. 86, May 15, 1952, p. 573.

Discusses recent work on the above.

8638 A Dynamical Model of a Crystal Structure. IV. Grain Boundaries. W. M. Lomer and J. F. Nye. *Proceedings of the Royal Society,* ser. A, v. 212, May 22, 1952, p. 576-584.

Four photographs of bubble rafts are used as a basis for discussion of the structure of grain boundaries in pure metals. In these photographs, one can follow the gradual transition from a small-angle boundary made up of clearly separate dislocations to a large-angle boundary where the dislocation structure is hardly recognizable. As the angle is increased, a continuous shortening of the dislocations, accompanied by the widening of a crack on the tensile side, is seen, and the process culminates in a structure which is described in terms of local fit and misfit. Range of validity of calculations of energy of dislocation walls, and slip and diffusion along grain boundaries, are also considered. 21 ref.

8639* Some Physical, Chemical, and Structural Phenomena Which Affect Mechanical Properties at Elevated Temperatures of Heat-Resistant Austenitic Alloys. (In French.) P. Chevenard and X. Wache. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 18, Apr. 1952, p. 127-136.

Describes and discusses various methods for investigation of the above. Results of application to various alloys of the above type are charted, tabulated, and illustrated.

8640* The Molybdenum-Silicon System. (In German.) Richard Kieffer and Ernst Cerwenka. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 101-105.

Describes production of alloys in above system by powder metallurgy and determination of phase relationships, hardness, and scaling resistance. Micrographs, macrographs, tables, and graphs. 20 ref.

8641* Systematization of the Structures of Alloys in Relation to the Heat of Formation. (In German.) Ulrich Dehlinger. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 109-111.

Examination of principal structures shows that alloys can be placed into two classes, namely those with dense structures and alloys of open structure formed by heteropolar bonding. The latter includes the Hume-Rothery alloys and the Zintl alloys. These two classes differ greatly in effect of atom concentration on heat of formation. Tables.

8642* Alloys of Titanium With Copper, Silver, and Gold. (In German.) Ernst Raub, Paul Wlater, and Max Engel. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 112-118.

Constitution diagrams of above alloys were determined with the aid of thermal, microscopic, and X-ray investigations. Structures and properties of the 9 systems of the metals of the 1st and 4th subgroup of the periodic system are compared. Only Cu and Au are found to alloy with Ti, while either solid or molten Ag is practically immicible in Ti. Tables, graphs, and photomicrographs. 10 ref.

8643* Slip Shrinkage in Mixtures of Metals and Metallic Oxides, and in Boron Carbide. (In German.) Walther Dawihl. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 138-142.

Proposes application of the theory that formation of slip layers causes shrinkage in metals and also in mixtures of metals with metallic oxides. Method of experimentation is described. Results obtained with mixtures of Fe and oxides of Al, Cr, Mg, Mn, Ti, or Fe are charted, tabulated, and illustrated by micrographs. Also reports results obtained with B_4C.

8644* Quantum Mechanics of the Cubic Body-Centered Structures of the Transition Metals. (In German.) K. Ganzhorn. *Zeitschrift für Naturforschung,* v. 7a, Mar.-Apr. 1952, p. 291-292.

Shows that the contribution of d-electrons to bonding in the body-centered lattice can be explained by determining their configuration in the b.c.c. lattice with the aid of group-theoretical considerations.

Miscellaneous Publications

8645 Survey of Portions of the Chromium-Cobalt-Nickel-Molybdenum Quaternary System at 1200°C. Sheldon Paul Rideout and Paul A. Beck. National Advisory Committee for Aeronautics, Technical Note 2683, Apr. 1952, 81 pages. (TL570 Un3t)

Microscopic and X-ray diffraction studies. Solid-solubility limits of the quaternary alpha phase were determined up to 20% Mo. The component Co-Ni-Mo, Cr-Cr-Mo, and Cr-Ni-Mo ternary systems were also studied. (Survey of these systems was confined to determination of the boundaries of the face-centered cubic (alpha) solid solutions and of the phases co-existing with alpha at 1200°C. 24 ref.

Books

8646 Slavy Magniia s Aliuminiem i Tsinkom. (Magnesium Alloys With Aluminum and Zinc.) V. I. Mikheeva. 190 pages. 1946. Academy of Sciences of the U.S.S.R., Moscow and Leningrad. (TN799.M2 M58s)

The ternary system Al-Mg-Zn was thoroughly investigated using methods of thermal analysis, microstructural investigation, and physicochemical analysis of the nature of intermetallic phases. Extensive graphs and tables.

See also:

8431 (phase diagram vs. solidification shrinkage)
8437 (Cu-Pb alloy system)
8443 (nodular cast iron—Swedish practice)
8561 (heat treatment vs. structure of steel wire)
8568 (structure of carburized iron layers)
8574 (structure of electrodeposited Cu films)
8656 (sigma phase in high Ni-Cr steel)
8659 (band structure in steels)
8701 (twinning in metallic crystals)
8703 (structure of sintered-solid metal bodies)
8711 (residual elements in nodular cast iron)
8731 (Mg-Th and Mg-Th-Ce system)
8759 (microstructure of Pt)
8764 (radiograph stress measurement on steel crystals)
8768 (Ta-O_2 system)
8930 (stroboscopic effect in X-ray analysis)

11. METALS—TRANSFORMATIONS AND RESULTING STRUCTURES

8647* Isotopic Exchange Between Metallic Silver and Its Ions in Solution. (In French.) Maria do Carmo Anta and Maurice Cottin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 21, 1952, p. 1686-1688.

The above was investigated with respect to the $Ag/AgNO_3$ system, using the powdered silver isotope Ag^{110}. Conclusions summarized exclude the possibility that rate of exchange is determined by self-diffusion in the metallic phase.

8648* Influence of Adsorption of Gases on the Surface Transformation of a Martensitic Structure by Tempering a Hardened Steel. (In French.) Joseph Maurer. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 28, 1952, p. 1773-1775.

Variation in rate of the martensite-pearlite transformation with

type of atmosphere present was studied. The effect is due to adsorption of gas at the surface of the crystalline lattice. Gases studied were H_2, Ne, A, and CO_2. The steel contained 0.8% C. Graphs.

8649* Growth and Crystallography of Deformation of β-Phase Uranium Single Crystals. (In English.) A. N. Holden. *Acta Crystallographica*, v. 5, Mar. 1952, p. 182-184.

Single crystals of the tetragonal β-phase of U were grown in material containing small amounts of Cr by a $\gamma \rightarrow \beta$ phase-transformation method. These crystals could be retained in a metastable condition for long periods following their quenching from normal β-phase temperatures into water at room temperature.

8650* The Problem of the Influence of Quenching Temperature of Steel on the Amount of Rsidual Austenite. (In Russian.) V. D. Sadovskii and G. N. Bogacheva. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 221-222.

Data from experiments with a steel containing 1.2% C, 0.20% Mn, and 6.0% Ni are claimed to prove that the conclusions of Harris and Cohen on the effect of quenching temperature on residual austenite are in error and that graphitization is the cause of the observed phenomena. Data are tabulated.

8651 Kinetics of Crystalline Nucleus Formation in Supercooled Liquid Tin. Guy M. Pound and Victor K. La Mer. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2323-2332.

Oxide-coated droplets of molten Sn of a narrow size range were supercooled to 120°C. below their melting point. The specimens, which were studied by means of a dilatometric technique, each consisted of several grams or about 10^{10} of the droplets. The supercooling is 10°C. lower than any previously obtained, and indicates greater purity of the droplets. Rate of nucleation of crystals in the droplets was measured dilatometrically as a function of temperature and droplet size. The nucleation process appears to be inhomogeneous. Application of Poisson's distribution function to the data shows that the nucleating impurities are present in amounts proportional to droplet area rather than volume. Two different theoretical equations for heterogeneous nucleation rate fit the data. Minimum solid-liquid interfacial free energy and kinetic coefficient for heterogeneous nucleation were calculated from the data. Tables and graphs. 15 ref.

8652 Stress-Recovery in Aluminium. W. A. Wood and J. W. Suiter. *Journal of the Institute of Metals*, v. 80, May 1952, p. 501-506.

Changes in strength and structure were observed during the deformation of Al in which the grains had already been broken down to a fine substructure by previous straining. "Stress-recovery" refers to the new structural growth effects produced by simultaneous heating and straining which are of an order of magnitude greater than that obtainable by heating alone. The phenomenon is interpreted. Graphs, diagrams, photomicrographs, and X-ray photographs. 17 ref.

8653 Allotropic Transformation in Titanium-Zirconium Alloys. Pol Duwez. *Journal of the Institute of Metals*, v. 80, May 1952, p. 525-527.

In Ti-Zr alloys, transformation from the high-temperature body-centered cubic β-solid solution to the low-temperature hexagonal close-packed α-solid solution is shown to take place, at least partially, at all compositions and at rates of cooling as high as 8000°C. per sec. Transformation is not complete; the amount of β-solid solution retained is a maximum in alloys containing 50 at. % of each metal. Graphs.

8654 Volume Change At the Ar_3 Transformation. A. H. Smith and F. C. Thompson. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 38-40.

In view of the great discrepancies between results obtained by earlier workers, above change associated with the $\gamma \rightarrow \alpha$ transformation was redetermined for a specially pure Armco iron, and found to be 1.16%. This figure is in good agreement with that derived from X-ray data. Since this value should be about 9% if the iron ion is the same size in both the γ and α forms, a significant change in ion size must occur, as is expected from the alteration in co-ordination number. It was found that this change amounts to a contraction of 2.4% of the ionic radius at the Ar_3 inversion, which agrees well with Goldschmidt's figures.

8655 Microscopical Studies on the Iron-Nickel-Aluminium System. Part III. Transformation of the β and β′ Phases. A. J. Bradley. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 41-47.

Photomicrographs illustrate the reactions that take place when the body-centered cubic structures of the Fe-Ni-Al system break up during cooling. The decomposition may take place either by deposition of the face-centered cubic lattice, or by its splitting into two phases, one ordered, the other disordered. The former process is predominant at higher temperatures, and the latter at lower temperatures. It is shown that high coercivity is exclusively connected with incipient breakdown of the nonmagnetic NiAl-rich ordered structure, which must remain predominant in order to form a continuous matrix. Under the most favorable circumstances, this precipitate consists entirely of the lamellar ferromagnetic Fe-rich β-phase. Discusses Fe_2NiAl type of permanent-magnet alloy. 25 ref.

8656 Occurrence of Sigma Phase in a High Chromium-Nickel Steel and the Effect of Carbon Content. R. E. Lismer and K. W. Andrews. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 49-58.

Effect of 0.06-0.29% C on sigma-phase formation in a commercial 21/15 Cr-Ni steel. Mode of formation of sigma phase from duplex austenite-ferrite, austenite-carbide, or austenite structures was investigated by consideration of changes produced by heating at 700 and 900°C. for periods of up to 2000 hrs. after solution treatment over temperatures from 950 to 1250°C. Results of microscopical and X-ray examination are given. Etching characteristics of the various phases and constitutents that may be present are described. 13 ref.

8657 Heterogeneous Nucleation of Graphite in Hypo-Eutectoid Steels. W. E. Dennis. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 59-63.

Effects of different atmospheres during graphitization, and of prior heat-treatment in the austenitic range, upon reaction rate, were investigated. It was found that the rapid graphitization of these steels is caused by heterogeneous nucleation of graphite by alumina dispersions formed by internal oxidation during graphitization. Rate of nucleation seems to be dependent on the extent to which the residual Al is segregated prior to graphitization. 22 ref.

8658* New Type of Graphitization of Cast Iron Cooled Through Eutectoid Range. (In English.) Keizo Iwase. *Japan Science Review*, v. 2, Aug. 1951, p. 189-196.

Purpose of study was to clarify the mechanism of formation of free ferrite in the "bull's eye" structure sometimes observed in blackheart malleable cast irons and in nodular cast irons, as well as in some pearlitic gray cast irons. Believes that such formation of free ferrite is caused by "lateral" Ar_3 transformation and that precipitation of graphite from free ferrite is a necessary condition. Graphs and micrographs.

8659* Banding of Steel. (In Swedish.) S. Baeckström. *Jernkontorets Annaler*, v. 136, no. 1, 1952, p. 9-20.

Reviews the above on the basis of the literature, in particular the causes of band structure, and some factors which influence formation of banding, lamination, and similar structures. 39 ref.

8660* The Phenomenon of Structural Precipitation. (In French.) *Journal d'Informations Techniques des Industries de la Fonderie*, Feb. 1952, p. 17-21.

Discusses the above with respect to Al-Cu alloys in particular, giving micrographic structure resulting from precipitation. Outlines various consequences. Tables and micrographs.

8661 Recrystallization of Tantalum. G. W. Wench, K. B. Bruckart, and R. H. Deibler. *Journal of Metals*, v. 4, June 1952, p. 596.

Primary recrystallization kinetics of high-purity Ta (99%), which had been reduced 40% in thickness by cold rolling, were studied and kinetic relations determined.

8662 Diffusion and Precipitation of Carbon in Some Alloys and Iron. Charles Wert. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 602-603.

Above were studied in Fe and in alloys containing small amounts of Ni, Mo, Cr, Mn, and V, by observing shape and position of the internal-friction peak at 0.9 cycles per sec.

11. *Metals—Transformations and Resulting Structures*

8663 Transformation in Cobalt-Nickel Alloys. J. B. Hess and C. S. Barrett. Journal of Metals, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 645-647.

A curve was determined showing the temperatures at which deformation begins to transform the cubic phase to the hexagonal phase in Co-rich Co-Ni alloys. A similar curve was determined for the strain-induced reverse transformation in the same alloys. The two curves agreed within experimental error and thus determine a curve of equal stability, which is also judged to be the curve giving equal free energy for the phases when they have the same composition.

8664 Effect of Applied Stress on the Martensitic Transformation. S. A. Kulin, Morris Cohen, and B. L. Averbach. *Journal of Metals,* v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers,* v. 194, 1952, p. 661-668.

Show sthat above transformation can be initiated by elastic stresses at temperatures above M_s in a steel containing 20% Ni and 0.5% C. Shear strains and normal tensile strains acting on a potential habit plane promote the transformation, but compressive strains oppose it. Graphs and micrographs. 23 ref.

8665 Low Temperature Properties of Tin, Soft Solders and Soft Soldered Joints. H. C. Watkins. *Research,* v. 5, May 1952, p. 231-234.

White tin undergoes transformation to the gray allotrope at low temperatures. It was though that this might cause failure in soldered joints. Shows that the change may be inhibited or retarded by the addition of traces of certain metals. Gives an indication of the optimum compositions for solders which are to be subjected to low-temperature conditions.

8666* Effect of Extremely High Cooling Rates on the Solidification and Structure of Binary Alloys. (In German.) Günter Falkenhagen and Wilhelm Hofmann. *Zeitschrift für Metallkunde,* v. 43, Mar. 1052, p. 69-81.

Describes preparation of supersaturated solid solutions of binary alloys by sudden quenching at rates up to 29,000°C. per sec. The X-ray back-reflection process was used to determine the amount of solute in solution. Alloys studied were Al-Ti, Al-V, Al-Cr, Al-Mn, Al-Fe, Pb-Na, Pb-Te, Pb-Ca, and Cu-Cr. Diagrams, tables, graphs, micrographs, and X-ray diagrams. 53 ref.

8667* Remarks on the Appearance of Sweating Out in Ingots. (In German.) Voya Kondic, William Shakespeare, and Geoffrey James Shaw. *Zeitschrift für Metallkunde,* v. 43, Mar. 1952, p. 95-97.

Describes experiments on various ferrous and nonferrous metals and alloys made to test the assumption that above is caused by different forces, such as hydrostatic forces, gas pressure, shrinkage, pressure, and capillary forces. Authors believe that this effect is primarly caused by shrinkage stresses under certain solidification conditions. Diagram, tables, and photomicrographs.

8668* Research on Grain Growth in the Primary Recrystallization of Slightly Deformed Aluminum Foil. (In German.) Klaus Eickhoff and Kurt Lücke. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 118-124.

Annealed, rolled, pure-Al foil, further reduced 4-7% and recrystallized at 350-400°C., revealed very slight formation of nuclei, which made it easy to measure rate of grain growth. Results are compared with those of other authors and conclusions on mechanism of grain growth are discussed. Several special phenomena accompanying grain growth are also discussed. Tables, graphs, and photographs. 13 ref.

Books

8669 Diffuziia v Metallakh i Splavakh. (Diffusion in Metals and Alloys.) Z. V. Bugakov. 212 pages. 1949. Government Publishing House for Technical-Theoretical Literature, Moscow and Leningrad, U.S.S.R. (QC185 B86d)

Presents results of investigations by the author and co-workers on the above problem. It is divided into two principal sections: atomic diffusion and reactive diffusion. The latter includes a subsection on the reaction of iron with molten zinc (theory of zincification of iron.) Graphs and tables. 101 ref.

See also:
8567 (isothermal transformation of alloy steel)
8615 (preferred orientation in recrystallized Cu)
8619 (transformation of Se)
8682 (transformation of pure Cr)
8698 ("Metal Interfaces"—book)
8719 (Al nucleation and ordering)
8755 (solidification of metals)

12. METALS—PHYSICAL PROPERTIES AND TESTS

8670* The Thermoelectric Power of Very Thin Strips of Aluminum. (In French.) Jean Savornin and Georges Couchet. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 16, 1952, p. 1608-1610.

Thermoelectric power of Al-Cu couples formed between vacuum-deposited thin films of Al on sheet glass and pure Cu wires was determined between 0 and 300°C. as a function of film thickness. Tables and graphs.

8671* The Adsorption of Cations by Metals, Demonstrated by Use of Radioactive Tracers. (In French.) Julio Palacios and A. Baptista. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 21, 1952, p. 1676-1677.

Theoretical and experimental study based on the hypothesis that the potentials of electrodes are produced by adsorption of cations. Wires of Pt, Pd, Au, Ag, Cu, Pb, and Fe were immersed for definite periods in $Zn^{65}SO_4$, removed and washed, then studied with a Geiger counter to determine the amount of adsorption which took place.

8672* Study of a Ferronickel at a Very Low Voltage in Static and Alternating Fields. (In French.) Israël Epelboin and Guy Gilardin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, May 5, 1952, p. 1860-1862.

Two methods for the study of magnetization in static and alternating fields, applied to test pieces of closed magnetic current, for the purpose of comparing mumetal strips of high permeability. Proposes an explanation of the magnetic properties.

8673* Influence of Carbon on Interfacial Tension of Iron at the Slag-Metal Boundary. (In Russian.) S. I. Popel, O. A. Esin, and Iu. P. Nikitin. *Doklady Akademii Nauk SSSR,* new ser., v. 83, Mar. 11, 1952, p. 253-255.

A study was made of the surace tension of molten Fe when exposed to slag instead of gaseous media. Data are charted.

8674 The Heat Capacity and Entropy of Gold From 15 to 300°K. T. H. Geballe and W. F. Giauque. *Journal of American Chemical Society,* v. 74, May 5, 1952, p. 2368-2369.

Above were measured. Heat capacity at constant volume was calculated and compared with the Debye equation. Results, compared with those on several other face-centered-cubic metal crystals, show that the distribution of vibrational frequencies is characteristic of each metal. Entropy, heat content, and free energy are tabulated.

8675 Nickel Oxides; Relation Between Electrochemical Reactivity and Foreign Ion Content. Robert L. Tichenor. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 973-977.

Theoretical explanation of the electrochemical effects of adding Li, Bi, and Fe to the Ni electrode of alkaline storage batteries. Explains how these metals affect the electrode.

8676 Magnetically Induced Ultrasonic Velocity Changes in Polycrystalline Nickel. S. J. Johnson and T. F. Rogers. *Journal of Applied Physics,* v. 23, May 1952, p. 574-577.

Measurements of the above are discussed. Shear and compressional ultrasonic-propagation modes are used throughout the range of 1-10 mc. The polycrystalline measurements are compared to recently published single Ni-crystal values. 16 ref.

8677 Heat Conduction in Alloys at Low Temperatures. I. Estermann and J. E. Zimmerman. *Journal of Applied Physics,* v. 23, May 1952, p. 578-588.

Describes method by which the thermal conductivity of relatively small samples (⅜-¾ in. diam., ½ in. long) of various materials can be measured in the temperature regions obtainable with liquid N_2, H_2, and He. Preliminary measurements on several commercial alloys (Monel, Inconel, and stainless steel) were made. Tables and numerous graphs. 16 refs.

8678 The Mechanism of Hydrogen Evolution at Nickel Cathodes in Aqueous Solutions. J. O'M. Bockris and E. C. Potter. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 614-628.

A study of the above in which hydrogen overpotential at Ni cathodes was measured under very pure conditions. Observations were also made of buildup and rate of decay of overpotential and of capacity of the electrode/electrolyte interface. The most probable mechanism of hydrogen overpotential at Ni cathodes is that of a rate-determining discharge step followed by a recombination of hydrogen atoms. Apparatus diagrams, graphs, and tables. 30 ref.

8679 The Heat Capacities of Uranium, Uranium Trioxide, and Uranium Dioxide from 15°K to 300°K. W. M. Jones, Joseph Gordon, and E. A. Long. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 695-699.

Data were obtained in 1942 by a calorimetric method. A maximum was observed at 28.7°K. in the heat capacity curve of UO_2, which is probably a result of the changing population of the magnetic quadrivalent uranium ions among their available energy states. Entropies and free energies of formation are given. Tables and graphs. 17 ref.

8680 Activity of Sulphur in Liquid Iron and Steel. Charles W. Sherman and John Chipman. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 597-602.

The chemical behavior of sulfur in liquid ions at 1600°C. was investigated through study of the equilibrium of the reaction: $H_2+S=H_2S$. From the known equilibrium constant of the reaction and the experimental data, activity of sulfur in the melt was determined. Effects on activity coefficient of P, C, Al, Si, Cu, and Mn were determined. A semi-empirical method was devised for calculating activity coefficient of sulfur in complex solutions of 4 or more components and tested against extensive data on solutions of this kind. 12 ref.

8681 Solid Solubility of Sulphur in Iron. Terkel Rosenqvist and Boleslaw L. Dunicz. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 604-608.

The work was based on measurement of chemical activity of sulfur in the solid solution by means of equilibrium with a mixture of H_2 and H_2S. When the solid-solubility limit is reached, the S activity in the Fe becomes equal to that in the coexisting sulfide phase. Apparatus and procedure are described; data are charted and tabulated. Phase diagram for the low-S region of the Fe-S system is presented. 10 ref.

8682 Melting Point and Transformation of Pure Chromium. D. S. Bloom, J. W. Putnam, and N. J. Grant. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 626.

Because of wide variations in recent melting-point determinations, a new study was made using very pure Cr. Result of 1903°C. for melting point is believed to be accurate to ±10°C. Temperature of the $\alpha \rightarrow \beta$ and reverse transformations were also determined.

8683 Optical Temperature Scale and Emissivities Of Liquid Iron-Copper-Nickel Alloys. David B. Smith and John Chipman. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 643-644.

Range of measurements on Cu-free metals was extended from the melting point to 1600°C. For Cu, the upper limit was 1380°C. and the data were extrapolated linearly for comparison with observations on the other metals and alloys at 1535°C.

8684 Adsorption of Oxygen on Silver. F. H. Buttner, E. R. Funk, and H. Udin. *Journal of Physical Chemistry*, v. 56, May 1952, p. 657-660.

The above was found from results of determinations of the surface tension of solid Ag in pure He and in an atmosphere of controlled He-O_2 mixtures in the range 870-945°C. Apparatus diagrams, graphs, and 10 ref.

8685 Thermal Expansion of Aluminum and Some Aluminum Alloys. Peter Hidnert and H. S. Krider. *Journal of Research of the National Bureau of Standards*, v. 48, Mar. 1952, p. 209-220.

A study of a wide variety of the above for various temperature ranges between −50 and +400°C. by the fused-quartz tube and dial-indicator, and by precision micrometric methods. Ternary diagrams are given for effects of composition on expansion of Al-Cu-Ni and Al-Si-Cu alloys. Tables and graphs. 16 ref.

8686 Magnetic Domains on Silicon Iron by the Longitudinal Kerr Effect. C. A. Fowler, Jr., and E. M. Fryer. *Physical Review*, ser. 2, v. 86, May 1, 1952, p. 426.

Observations of Kerr effects were made by illuminating the surface with a small optical probe, passing the reflected beam through a nicol analyzer and measuring the intensity of the transmitted light with a sensitive multiplier phototube circuit. Results seem comparable with the magnetic powder patterns obtained by Williams, Bozorth, and Shockley.

8687 Effect of Torsion on a Longitudinally-Magnetized Iron Wire. *Wireless Engineer*, v. 29, May 1952, p. 115-117.

Summarizes two communications recently received from W. V. Dromgoole of New Zealand. Results of experiments are summarized and practical applications are suggested in connection with torque-measurement and transmission of data involving conversion of mechanical movements into electrical signals of varying amplitude and phase. Magnitude of the effect appears to be a function of permeability. Diagrams and graphs.

8688* Effect of the Blocking Layer on the Tarnishing Process at the Metal-Selenium Boundary. (In German.) Siegfried Poganski. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 45, Mar. 1952, p. 193-198.

Cd and Se in close contact, which have a marked blocking effect, were used to investigate the expected effect of the blocking layer at the boundary between a metal and certain metalloids on the rate of tarnishing of this layer at different temperatrues. Diagrams and graphs. 14 ref.

8689* Activities in the Molten Ternary Na-Pb-Hg System. (In German.) F. Halla and R. Herdy. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Mar. 1952, p. 213-218.

Measurements of emf.'s and of vapor pressures were made to determine reactivities, heats of mixing, and affinities of above. Graphs and tables.

8690* Heat of Fusion of Aluminum and Germanium. (In German.) Franz Eberhard Wittig. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 158-161.

Proposes improvements in the experimental set-up customary for investigations of the above. The improvement is achieved mainly by using a control device developed by the author. Results achieved by the new method are indicated. Tables and diagrams. 13 ref.

8691* Internal Friction of Molten Silver-Copper-Gold Alloys. (In German.) Erich Gebhart and Georg Wörwag. *Zeitschrift für Metallkunde*, v. 43, Apr. 1952, p. 106-108.

Results of measurement of above show that viscosity of these ternary alloys increases with declining temperature and increasing Au content. Tables and graphs.

8692* Red-Tinted Alloys in the Copper-Zinc-Aluminum System. (In German.) Franz Lihl. *Zeitschrift für Metallkunde*, v. 43, Apr. 1952, p. 124-126.

Research on above reveals that in alloys with 30-50% Zn, increasing the Al content changes the color from light yellow to copper-red, which is ascribed to the β_1-phase. Tables and graphs show that the color effect of Al varies with the Zn content.

8693* Mechanism of "Explosion" of Wires. (In German.) Bruno Eiselt. *Zeitschrift für Physik*, v. 132, no. 1, 1952, p. 54-71.

When a highly charged condenser is discharged through a thin wire, the wire often vaporizes suddenly in a manner resembling an explosion. This phenomenon was investigated, using optical, motion-picture, electrical, and oscillographic techniques. Methods and equipment are described and diagrammed; typical results on Cu and Fe wires are charted and illustrated. 18 ref.

Miscellaneous Publications

8694 The Influence of Inhibitors Upon Electrochemical Processes on Metallic Surfaces. (In German.) H. Fischer. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Edi-

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trice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 105-115; disc., p. 115-116. (QC311 C73c)

Defines inhibition of electrode surfaces, and its various consequences such as polarization, negative catalysis of resulting reactions, reduction and oxidation of inhibitors, and modification of the crystallization process. The specific susceptibility of the metal atoms to inhibitors is indicated; and its variation in the submicroscopic realm of the crystals is discussed. Tables and graphs. 11 ref.

8695 General Outline of Polarization Phenomena of Metals. (In French.) R. Piontelli and G. Poli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 136-146, disc., p. 147-148. (QC311 C73c)

Discusses apparatus used by the authors, beginning with the first experiments, and summarizes the results obtained concerning, in particular, metals with normal electrochemical behavior. Includes graphs and schematic diagram.

8696 Ionic and Structural Properties and Electrochemical Behavior of Metals. (In French.) R. Piontelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 163-184; disc., p. 184. (QC311 C73c)

Discusses, in particular, aspects of the electrochemical behavior of metals with respect to electrodes exchanging their ions with a solution. Includes table. 32 ref.

8697 Influence of the Anion on the Electrochemical Behavior of Metals. (In French.) R. Piontelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 185-196; disc., p. 196-197. (QC311 C73c)

Presents results of a systematic study of the above, both on the part of the anode and of the cathode. Includes tabular data. 27 ref.

Books

8698 Metal Interfaces. 348 pages. 1952. American Society for Metals, Cleveland, Ohio. (TA407 Am35m)

A series of papers presented at 33rd National Metal Congress and Exposition, Detroit, Oct. 13-19, 1951. The first two present theoretical considerations regarding structure and energies of surfaces and boundaries. There follows an application of topological considerations governing shapes of metal grains. Following papers critically analyze methods of quantitatively measuring the energy of surfaces and boundaries, and describe application of interfacial-energy principles to phenomena of boundary migration. Stress relaxation at interfaces is covered in the next paper. The final three papers consider the property effects of interfaces with respect to phase transformations, mechanical properties, and chemical properties. Individual papers are separately abstracted.

See also:

8434 (superalloy properties)
8493 (conductivity of sintered Fe)
8564 (precipitation-hardening stainless steel)
8620 (atomic scattering factor of Cd and Mg)
8637 (nuclear resonance of transition metals)
8641 (structures and heats of formation)
8654 (volume change of Fe at Ar_3 transformation)
8655 (magnetic properties in Fe-Ni-Al system)
8732 (strain-effects on electrical conductivity of metals)
8753 (physical properties of cemented carbides)
8771 (electrode potentials of Fe)
9021 (spring materials—physical properties)
9025 (electrode potentials of Pb anodes)
9350 (hydrogen overpotential of metals)
9368 (electrode potential of Hg)
9385 (cathodic O_2 reduction on Au and Pt)
9386 (overvoltage of H_2 on Pt)
9400 (electrochemical equilibria)
9403 (electrochemical behavior of Pb)
9404 (electrichemical behavior of Ag)
9405 (electrochemical behavior of Zn)
9659 (magnetic structure of Alnico 5)
9670 (magnetostriction variation of "Alcomax")
9681 (magnetic properties of Fe and Ni)
9708 (electrical conductivity of Pt deposits on dielectrics)
9711 (electrical properties of Al-wound transformers)
9725 (hysteresis testing of magnetic materials)
9729 (magnetic core transformer materials)
9785 (iron in Evans cells)

13. METALS—MECHANICAL PROPERTIES AND TESTS

8699* A Study of Cold-Worked Aluminium by an X-Ray Micro-Beam Technique. (In English.) **I. Measurement of Particle Volume and Misorientations.** P. B. Hirsch and J. N. Kellar. **II. Measurement of Shapes of Spots. III. The Structure of Cold-Worked Aluminium.** P. B. Hirsch. *Acta Crystallographica*, v. 5, Mar. 1952, p. 162-175.

X-ray, microbeam, back-reflection photographs permit determination of mean particle size and disorientation, and of their variations with degree of deformation, time after rolling, and purity of specimen. In Part II, a method is described for obtaining, from the shapes of the spots on spotty-ring photographs, approximate values of physical broadening of the reflections. In Part III, results reported in the two previous installment are discussed in the light of present theories of plastic deformation of metals. 30 ref.

8700* Thermal Fatigue of Aluminum Single Crystals. (In Russian.) V. I. Arkharov and A. K. Semenova. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 681-683.

The above was investigated by cycling specimens between 15°C. and 300, 400, and 500°C. for various lots. X-ray diffraction was used to study the deformations. Includes Laue patterns.

8701* The Theory of the Development of Twins in Metals, Alloys, and Laminated Crystals. (In Russian.) G. S. Zhdanov. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 685-688.

A theoretical discussion. 10 ref.

8702* Rheological Consideration of Creep of Steel. (In German.) Hans Umstätter. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 119-124; disc., p. 124-126.

Proposes the application of rheology, particularly its concepts of ductility and relaxation, to creep of various substances. Compares results of tensile tests, compression tests, and notched-bar, impact-bending tests on bituminous asphalt with those obtained on steel wire. An interpretation of the results is indicated. Tables and graphs. 14 ref.

8703* Joining of Sintered Bodies to Compact Metals. (In German.) Wilhelm Hofmann and Ernst Schmalenbach. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 135-142; disc., p. 142-143.

Describes experimental set-up and types of rods used for tensile tests and shearing tests on compound bodies of above type. Four types of Fe-powder compacts were used in the tests. Influence of pressure, sintering temperature, and sintering time are indicated. Results of metallographic investigation of the test specimens are interpreted, especially the effect of Cu additions to Fe powder. Graphs, micrographs, diagrams, and photographs. 13 ref.

8704* Measurement of Tensile Stress, Rolling Pressure, and Rolling Work by Means of Electrical Strain Gages. (In German.) Kurt Fink and Werner Lueg. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 151-156.

Describes experimental apparatus for the above. Results of tensile and cold-rolling tests are indicated; application of the method in industry is outlined. Diagrams, tables, and graphs. 10 ref.

8705* Practical Stress Analysis With Electrical Strain Gages. (In German.) Otto Krisement. *Archiv für das Eisenhuttenwesen*, v. 23, Mar./Apr. 1952, p. 157-161.

Shows the computation of elongations in stress values; de-

scribes graphic, nomographic, mechanical, and electrical processes for interpreting these values. Some devices used for this purpose are characterized. Diagrams.

8706 Uses of Titanium in Turbojets. N. H. Hanink. *Automotive Industries*, v. 106, May 15, 1952, p. 90, 92, 96. (A condensation.)

Refers to components common to all engine types, since security regulations do not permit discussion of the internal parts of any particular engine. Comparative mechanical properties of potential compressor-disk materials vs. temperature are charted.

8707 Principal Strains in Cable Sheaths and Other Buckled Surfaces. I. L. Hopkins. *Bell System Technical Journal*, v. 31, May 1952, p. 523-529.

Equations are developed for rigorous determination of magnitudes and directions of principal strains in plastic deformation, by means of measurements of rectangular strain rosettes. Application to study of telephone-cable sheath is described.

8708* Tin and Arsenic in Annealed Alloy Structural Steels. (In German.) H. Krainer and W. Daum, *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 97, Apr. 1952, p. 67-72.

Effects of Sn contents up to 0.4% and of As contents up to 0.5% on hardness and notch-impact toughness of 15 different steels under different heat-treating and quenching conditions. Results show that As and Sn have undesirable effects. Photographs, tables, and graphs. 14 ref.

8709* An Impact-Notch Notch-Impact Sample. (In German.) R. Mitsche. *Berg- und Hüttenmänische Monatshefte der Montanistischen Hochschule in Leoben*, v. 97, Apr. 1952, p. 72-73.

Describes a specimen for testing tendency to brittle fracture made by forming the notch by impact with a special device on the Charpy hammer.

8710* Some Current Views on the Mechanism of Creep. L. M. T. Hopkin. *Journal of the Birmingham Metallurgical Society*, v. 32, Mar. 1952, p. 15-33.

Critically surveys and discusses the above. Illustrated by graphs and micrographs taken from the literature. 34 ref.

8711* The Harmful Influence of Some Residual Elements in Magnesium-Treated Nodular Cast Irons and Their Neutralization by Cerium. H. Morrogh. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Apr. 1952, p. 292-314.

The harmful effects of Ti, Pb, Sb, Bi, Al, and Cu in Mg-treated nodular cast irons are described. The influence of Sn and As are also dealt with. Tabular data. 12 pages of photomicrographs.

8712* The Bending and Twisting of Anisotropic Plates. R. F. S. Hearmon and E. H. Adams. *British Journal of Applied Physics*, v. 3, May 1952, p. 150-156.

The theory of the deflection of anisotropic plates under bending and twisting loads is summarized. Experimental methods for investigating the theory are described and tested on Al, brass, and mild-steel plates. The results of experiments on plywood cut at various angles to the grain are given and found to conform with the theory. Apparatus and other diagrams and tables.

8713* The Flow of Metals. E. N. da C. Andrade. *Engineer*, v. 193, May 16, 1952, p. 658-659; May 23, 1952, p. 692-693.

Sixth Hatfield Memorial Lecture. Author reviews knowledge about creep of metals under stress. The metals concerned are Pb, Sn, Cu, Fe, Cd, and solid Hg. Shows that creep behavior of all these and many other materials is very similar if allowance is made for temperature and can be expressed by a simple equation. Discusses the physical mechanism of creep. 18 ref.

8714* War on Wear. H. Blok. *Engineering*, v. 173, May 9, 1952, p. 594; May 16, 1952, p. 625-626.

A general discussion of fundamental principles, types of wear, and means of combating it.

8715* Absolute Hardness Scale. J. Murkes. *Engineers' Digest*, v. 13, Apr. 1952, p. 112-114. (Translated and condensed from *Teknisk Tidskrift*, v. 82, Jan. 15, 1952, p. 37-40.)

Critically considers known methods of hardness determination. Discusses in particular that of Chrustiov and shows its applicability. Graphs and tables.

8716* The Hardness of Transition Zones in Unalloyed and Low-Alloy Steel and Possibilities of Predicting It. (In Swedish.) Tore Norén and Lauri Pietiläinen. *Esab's tidning Svetsaren*, v. 16, Apr. 1952, p. 71-90.

Discussion of effect of carbon content and heat treatment on hardness includes numerous graphs, photomicrographs, and tables.

8717 Low-Stress Torsional Creep Properties of Pure Aluminium. W. Betteridge. *Bulletin of the Institute of Metals*, May 1952, p. 76-77. (Bound with *Journal of the Institute of Metals*, v. 80, 1952.)

A study in reference to effects of cold work and annealing on creep behavior. Torsion-creep curves were determined on super-purity Al using ¼-in.-diam. test rods at constant stress at 200°C. Additional tests were made on single crystals. Graph and table.

8718 A Study of Some Factors Influencing the Young's Modulus of Solid Solutions. A. D. N. Smith. *Journal of the Institute of Metals*, v. 80, May 1952, p. 477-482.

Values for a series of binary solid solutions of Cu with Zn, Ga, Ge, Si, and As, and of Ag with Cd, In, and Sn were measured dynamically at room temperature. In agreement with earlier work, it was found that, in any one system, the modulus decreases approximately linearly with atomic percentage of the solute, although rate of decrease differs for each system. This rate of decrease depends not only on difference in atomic radii of the solute and solvent, but also on difference in valency between the two constituents. 17 ref.

8719 The Ageing Characteristics of Ternary Aluminium-Copper Alloys With Cadmium, Indium, or Tin. H. K. Hardy. *Journal of the Institute of Metals*, v. 80, May 1952, p. 483-492.

Hardness vs. aging-time curves were obtained between 30° and 240°C. for Al-Cu alloys containing 2, 3, or 4% Cu with 0.01 or 0.05% In or Sn. Includes thermodynamic analysis of short-range ordering in ternary solid solutions. Graphs and tables. 39 ref.

8720 Residual Stresses in Chill-Cast and Continuously Cast Aluminium Alloy Billets. R. A. Dodd. *Journal of the Institute of Metals*, v. 80, May 1952, p. 493-500.

Effect of the following variables on the magnitude of internal stresses in chill-cast Al-alloy billets was studied: length of billet, diameter of billet, pouring temperature, and rate of flow of cooling water. Stresses were determined mechanically by Sach's boring method and shown to be independent of billet dimensions and of rate of flow of cooling water, but to increase approximately linearly with increase in pouring temperature. Effect of pouring temperature and rate of pouring on residual stresses in semi-continuously cast billets was also studied. Graph and tables.

8721 Creep Processes in Coarse-Grained Aluminium. D. McLean. *Journal of the Institute of Metals*, v. 80, May 1952, p. 507-519.

A specimen of super-pure Al was extended under a constant load of ⅛ ton per sq. in. at 200°C. to fracture, which occurred at 65% extension in 850 hr. Observations were made of slip-band and grain-boundary movements which were measured, mainly by means of an interference microscope, and their respective contributions to the creep extension calculated. Tables and photomicrographs. 23 ref.

8722 Electron-Microscopic Studies of Slip in Aluminium During Creep. J. Trotter. *Journal of the Institute of Metals*, v. 80, May 1952, p. 521-523.

Slow deformation of a specimen of 99.98% Al at 200°C. was studied by means of the electron microscope, using the plastic-replica process. Shows that slip zones do not consist of bundles of long parallel slip lamellae of the type found by Heidenreich and Shockley in room-temperature deformation, but of intimate segments of primary and cross-slip. Electron micrographs. 10 ref.

13. *Metals—Mechanical Properties and Tests*

8723* The Size Effect in Fatigue of Plain and Notched Steel Specimens Loaded Under Reversed Direct Stress. C. E. Phillips and R. B. Heywood. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 176, W.E.P. 65, 1951, p. 113-124; disc., p. 130-140.

Fatigue strength was determined for specimens of various diameters in the range 0.19-2.4 in. for a 25-ton mild steel and a 65-ton, 2½% Ni-Cr steel. No intrinsic size effect was observed with plain specimens, but size effects were found for notched specimens. Graphs, tables, photographs, and micrographs.

8724* Some Fatigue Tests on Aluminium-Alloy and Mild-Steel Sheet, With and Without Drilled Holes. C. E. Phillips and A. J. Fenner. *Institution of Mechanical Engineers, Proceedings* (Applied Mechanics Div.), v. 165, W.E.P. 65, 1951, p. 125-129; disc., p. 130-140.

Describes above, under pulsating direct stress, of panels approximately 0.1 in. in thickness and up to 12 in. maximum width. Size effects occur for both panel and hole size. Tables, diagrams, graphs, and photographs.

8725 Rare Earths Boost Creep Resistance to Mg-Zr Alloys. W. G. Patton. *Iron Age*, v. 169, May 22, 1952, p. 134-136.

By adding 2-4% rare earths to Mg-Zr alloys, Dow Chemical has produced new alloys with outstanding high-temperature properties.

8726 The Dynamic Theory of Yield. K. E. Puttick and M. W. Thring. *Iron & Steel*, v. 25, May 1952, p. 155-159.

Reviews and critically discusses theories proposed for the above. Recent work on tensile and compressive impact tests, brittle fracture, and the onset of twinning, is reviewed in light of the theory. Graphs. 25 ref.

8727* Soap Film Technique for Solving Torsion Problems. (In English.) Ken Ikeda. *Japan Science Review*, v. 2, Aug. 1951, p. 113-118.

Describes and illustrates above technique for study of stresses in solids.

8728* On the Estimation of Properties of Cast Iron by Chill Tests. (In English.) Nobuaki Ogura. *Japan Science Review*, v. 2, Aug. 1951, p. 203-210.

Small, sensitive, wedge-shaped test pieces were used in the experiments. Quantitative relations among chill thickness of fracture, chemical composition, and tensile strength were investigated. By application of these comparatively small test pieces, estimation of properties is possible immediately after tapping. Results are charted, tabulated, and discussed.

8729 Compression Texture of Iodide Titanium. D. N. Williams and D. S. Eppelsheimer. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 615-618.

Above was determined and found to consist of a (0001) texture rotated 15-30° from the axis of compression. As the amount of reduction increases, the angle of rotation decreases.

8730 Observations of Creep of the Grain Boundary In High Purity Aluminum. H. C. Chang and N. J. Grant. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 619-625.

Reports some experimental observations of behavior of the grain boundaries and their effect on deformation in the grains. High-purity Al was used to avoid complications. Includes excellent micrographs. 16 ref.

8731 Effect of Zirconium on Magnesium-Thorium and Magnesium-Thorium-Cerium Alloys. T. E. Leontis. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 633-642.

Data show that addition of Zr to sand-cast Mg-Th alloys effects a marked decrease in grain size which is accompanied by a significant increase in mechanical properties over the entire range of Th content investigated. The beneficial effect is maintained at temperatures up to 700°F. In addition the alloys exhibit exceptionally high creep resistance up to 600°F. Ce was found to be a desirable addition to Mg-Th-Zr alloys. Extensive tables, graphs, and micrographs. 13 ref.

8732 Effect of Prior Strain at Low Temperatures on the Properties of Some Close-Packed Metals at Room Temperature. W. C. Ellis and E. S. Greiner. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 648-650.

As temperature of deformation is lowered, flow strength and ultimate strength of a number of metals and alloys at room temperature are increased. Likewise, in materials in which lattice scattering predominates, electrical conductivity is decreased to a greater degree as temperature of deformation is lowered. Data given for a number of commercial metals and alloys rolled at −195°C. illustrate the increase in strength properties that may be obtained by such treatment.

8733 Deformation of Zinc Bicrystals by Thermal Ratcheting. J. E. Burke and Anna M. Turkalo. *Journal of Metals*, v. 4, June 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, 1952, p. 651-656.

Discusses phenomenon of "thermal fatigue" proposed by Boas and Honeycombe. The possibility was investigated that an additional mechanism might cause plastic deformation during thermal cycling—a "thermal ratchet" that depends upon a combination of grain-boundary flow to relax the stress that develops between differently oriented grains upon raising the temperature, and transcrystalline slip to relax the oppositely directed stress which develops on lowering the temperature. Theoretical analysis is followed by details of experiments on Zn bicrystals. Results are illustrated and discussed.

8734* A Calibrating Device for Impact Testing Machines. G. L. Brown. *Journal of Scientific Instruments*, v. 29, May 1952, p. 161.

8735 The Influence of Copper, Nickel and Tin on the Hot Working Properties of Mild Steel. G. G. Foster and J. K. Gilchrist. *Metallurgia*, v. 45, May 1952, p. 225-230.

A study of the above on the basis of bend tests carried out at high temperatures. Addition of Ni to Cu-bearing steels results in improved hot-working properties, while the addition of Sn to Cu or Cu-Ni steels has the reverse effect. Graphs and photographs. 15 ref.

8736 The Development of a Strain- or Displacement-Actuated Electronic Trigger for High-Temperature Stress-Relaxation Testing and Other Purposes. D. C. Herbert and D. J. Armstrong. *Metallurgia*, v. 45, May 1952, p. 267-270.

Describes above servo system and gives operating instructions. Schematic and wiring diagrams, and photographs.

8737 Influence of Heat-Treatment on the True Tensile Curves for Mild Steel. P. Bastien and C. Winter. *Metal Treatment and Drop Forging*, v. 19, May 1952, p. 213-216. (A translation.)

A study of the above and of the effect of heat-treatment on the plasticity modulus which characterizes the deep-drawing quality of dead-soft mild steel. The 3 steels used contained Ni in the range 0.15-0.17%; Cr, 0.08-0.11% and Cu, 0.15-0.30%. Tables and graphs.

8738* The Structure of Metals After Plastic Deformation. (In French.) Paul Bastien. *Métaux: Corrosion—Industries*, v. 27, Mar. 1952, p. 95-106.

The above was investigated from the macrographic, micrographic, and crystalline aspect, also the influence of cold and hot working on mechanical characteristics of ferrous and nonferrous metals. Micrographs, tables, and diagrams. 14 ref.

8739* Creep of Metals and Methods for Its Measurement. (In French.) E. Morlet. *Métaux: Corrosion—Industries*, v. 27, Mar. 1952, p. 107-118.

Outlines the different types of deformations of metal bars subjected to traction, deformations of metals and alloys as a function of weather and temperature, and influence of various factors on resistance to creep. Includes diagrams and charts. 17 ref.

8740* A Hardness Tester for Small Loads. H. Broschke. *Microtechnic* (English Ed.), v. 6, no. 1, 1952, p. 15-21. (Translated from the German.)

Describes, diagrams, and illustrates above apparatus, known as the "Durimet." It is primarily intended for testing small and

very small parts as well as of thin layers, such as present on surface or case-hardened workpieces, foil material, varnishes, plastics, edges and points of turning, milling, and other cutting tools, etc.

8741 Influence of Nitrogen on the Notch Toughness of Heat-Treated 0.3-Percent-Carbon Steels at Low Temperatures. Glenn W. Geil, Nesbit L. Carwile, and Thomas G. Digges. *Journal of Research of the National Bureau of Standards*, v. 48, Mar. 1952, p. 193-200.

Charpy impact tests were made at temperatures ranging from −196 to +100°C. on fully hardened and tempered specimens of 0.3% carbon steels with variable N_2 contents. Al-treated steels had considerably lower transition temperatures than those of steels not treated with Al. Graphs. 38 ref.

8742 Delayed Fracture of Metals Under Static Load. N. J. Petch and P. Stables. *Nature*, v. 169, May 17, 1952, p. 842-843.

Discusses theory of the above and its relationship to the same behavior of glass. Considers theory of hydrogen embrittlement and outlines results of experiments on tensile strength and shock resistance of H_2-free and H_2-charged iron.

8743* The Influence of Gas in Steels. (In French.) A. Kohn. *L'Ossature Métallique*, v. 17, May 1952, p. 236-238.

Reviews the above on the basis of the literature, particularly effects on mechanical properties of basic Bessemer steel with a low N content. Graphs. 16 ref.

8744* Large Mechanical Fatigue Test Installation (G. I. M. E. D.) of the Belgian Industrial Association (A. I. B.) (In French.) L. Baes and Y. Verwilst. *L'Ossature Métallique*, v. 17, May 1952, p. 267-276.

Reports on a series of fatigue tests done on large steel beams. Structural details of the equipment are described, such as its size, capacity, and various testing possibilities. Series of photographs.

8745 Selecting Metals for Low Temperature Service. J. R. Watt. *Product Engineering*, v. 23, June 1952, p. 158-161.

Factors affecting impact strength at room temperature increase in importance at subzero temperatures. Tells how grain size, carbon content, alloy content, heat treatment, and welding temperatures of steel affect transition temperature. Also gives data for tin and solder, Zn-base alloys, wrought and ingot iron.

8746* Research on the Exhaust Valves of Airplane Engines. (In French.) E. H. Bucknall and F. A. Ball. *Revue de Métallurgie*, v. 49, Apr. 1952, p. 249-261; disc., p. 261.

Describes research during the war at Mond Nickel Co., England, on the improvement of materials and methods of production of the above. Micrographs show crack formation and microstructure under various circumstances and in different materials, especially 80-20 Ni-Cr alloys and an alloy steel containing 0.35-0.50% C, 1.0-2.5% Si, 1.50% Mn max., 10% Ni min., 12.0-16% Cr, and 2.0-4.0% W. An alloy of 74% Ni, 20% Cr, and 6% Fe was also studied, as well as effects of 1% Cb on it. Mechanical properties (shock resistance and hardness) were studied. Data are tabulated.

8747* Contribution to the Study of the Wear of Cutting Tools. (In French.) E. Eugène. Revue de *Métallurgie*, v. 49, Apr. 1952, p. 267-282; disc., p. 282.

Various factors responsible for the above were investigated, particularly the influence of sharpening angle and of cutting rate. Describes method for measuring the wear resistance of cutting tools. Presents results obtained with various toolsteels. Includes micrographs, tables, and diagrams.

8748 A Study of Some Impacts Between Metal Bodies by a Piezo-Electric Method. A. W. Crook. *Proceedings of the Royal Society*, ser. A, v. 212, May 7, 1952, p. 377-390.

Continuous measurements of the force throughout impacts between metal cylinders and between a hard sphere and metal flats are described. The force was measured piezo-electrically. Results agree closely with force-time curves calculated, assuming that deformation is opposed by a constant pressure. Theory discussed. Graphs and tables. 11 ref.

8749* Influence of Mechanical Polishing and Electropolishing on the Micro- and Macrohardness of Metals. (In German.) Th. Geiger. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Feb. 1952, p. 41-46.

Describes experiments on the above, applied to 18-8 austenitic steel, electrolytic iron, and carbon steel. The results are interpreted, showing that both mechanical and electrolytic polishing result in considerable surface hardening, particularly of austenitic steels. Micrographs and radiographs confirm results of the hardness tests. Graphs and tables.

8750* Creep-Stress Tests on Malleable Anticorodal B, Age-Hardened Avional-23, and Soft Peraluman at 26, 100, and 130°C. (In German.) E. von Burg. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Mar. 1952, p. 73-86.

Above includes investigation of creep-stress behavior of notched bars. Shows that creep strength of light metals is greatly affected by production conditions, so that same producer may deliver, at different times, a given light metal with different creep resistances. Graphs and tables.

8751* High-Temperature Materials: Tests Used as Criteria of Service Behaviour. (In English.) L. B. Pfeil. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Mar. 1952, p. 88-97.

Presents general discussion of the above, based on critical evaluation of the literature and the author's experiences. Discusses separately creep resistance, fatigue strength, corrosion resistance, and thermal-shock resistance, said to be the most important properties for high-temperature service. Emphasis is on behavior of Nimonic 80, a high-Ni alloy. 25 ref.

8752* The Influence of Surface Films on the Friction of Solid Bodies. (In German.) F. P. Bowden. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Apr. 1952, p. 116-127.

Reviews recent investigations on the above, with particular respect to friction between metals. Effects of the mechanical properties of the oxide layers, of the lubricant film, and of attack by chemical agents are indicated. Tables and diagrams. 17 ref.

8753* Comparative Representation of the Properties of Cemented Carbide Alloy. (In German.) Carl Ballhausen. *Stahl und Eisen*, v. 72, Apr. 24, 1952, p. 489-492.

Describes and illustrates graphical representation of the above, from which a standard designation system for the carbide alloys is developed. Mechanical and physical properties are tabulated.

8754 Plating Effects Tested. *Steel*, v. 130, June 16, 1952, p. 104.

Brief report of effect of several Cr-plating solutions on the fatigue strength of aircraft-quality SAE-4130 steel. Table.

8755* The Slip Process and Solidification of Metallic Substances. (In German.) A. Kochendörfer. *Zeitschrift des Vereines Deutschen Ingenieure*, v. 94, Apr. 1, 1952, p. 267-273.

Literature review. Discusses the process both in mono- and polycrystals. Application of the results to technical problems is indicated. Schematic diagrams, tables, and graphs. 22 ref.

8756* Repeated Load Tests on Welded and Prestrained Steels. Sadun S. Tör, Jan M. Ruzek, and Robert D. Stout. *Welding Journal*, v. 31, May 1952, p. 238s-246s.

Details of development of test specimens and procedure and of test equipment. Repeated-load machine includes SR-4 strain gages for calibration of strains. Al-killed A-201 and rimmed A-285 steel plates ⅝ in. thick were tested after various heat-treating, bead-welding, or tensile-straining pretreatments, at room temperature and at 500°F. Origin of cracking is discussed. Micrographs, diagrams, illustrations, and graphs.

13. *Metals—Mechanical Properties and Tests*

8757* The Effect of Quench-Aging on the Notch Sensitivity of Steel. J. R. Low, Jr. *Welding Journal,* v. 31, May 1952, p. 253s-256s.

Charpy impact-test specimens of a semikilled 1020 steel were quenched from 690°C. and aged at room temperature for periods up to 3 yrs. Transition temperature changes were followed. Suggests that quench-aging is responsible for the usual brittle zone adjacent to welds in above grade of steel and that a low-temperature post-heat treatment similar to that used for overaging should improve the low-temperature ductility of welded structures made of this and similar grades of steel. Graphs.

8758* Dimensional Effects in Fracture. *Welding Journal,* v. 31, May 1952, p. 271s-272s.

Discussion by Wendell P. Roop of above paper by C. W. MacGregor and N. Grossman, (Jan. 1951 issue.) Includes author's reply.

8759* Contribution to Metallographic Investigation of the Hot-Shortness of Corroded Platinum Ware. (In German.) Gerhard Neinacher. *Werkstoffe und Korrosion,* v. 3, May-June 1952, p. 192-197.

Polished sections of Pt ware, destroyed by pick-up of As, Bi, P or Si were examined microscopically in a vacuum up to about 850°C. Eutectic melting processes, which cause the hot-shortness, are clarified by the photomicrographs.

8760* Theory of the Strength of Materials. (In German.) Kurt Matthaes. *Zeitschrift für Metallkunde,* v. 43, Jan. 1952, p. 11-19; Mar. 1952, p. 90-95.

Discusses the above with particular regard to the elastic behavior of metals. The plastic state, the transition between elasticity and plasticity, and stress corrosion are discussed in detail. Data are tabulated and charted for a large number of pure metals and alloys. 63 ref.

8761* Microhardness Investigations of Supersaturated Aluminum-Manganese Alloys. (In German.) Helmut Bückle. *Zeitschrift für Metallkunde,* v. 43, Mar. 1952, p. 82-89.

Shows that the straight-line relationship between load and diameter of impression according to Meyer's exponential law applies only to highly pure metals and phases. A method of measuring the microhardness of the matrix is developed and applied to supersaturated solutions of Al-Mn alloys (3.0-6.7% Mn.) Graphs, tables, and micrographs. 12 ref.

8762* Mechanism of Tensile Deformation of Monocrystals. (In German.) Fritz Röhm and Jörg Diehl. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 126-128.

Attempts to explain a sudden increase in strength properties of cubic-face-centered crystals at a certain point during plastic deformation. Discusses behavior of high-purity Al reported previously and shows that this behavior is common to this type of crystals. 13 ref.

8763* Effect of Temperature and Rate of Deformation on Critical Shear Stress. (In German.) Franz Vitovec. *Zeitschrift für Metallkunde,* v. 43, Apr. 1952, p. 128-130.

Review of literature on above includes charted data for Sn, Cd, and Al. 14 ref.

8764* Radiographic Stress Measurements of Individual Crystals of Steel Under Tensile Stress. (In German.) Gerhard Frohnmeyer and Ernst-Günter Hofmann. *Zeitschrift für Metallkunde,* v. 43, May 1952, p. 151-158.

Describes method of oblique exposure for making radiographs on the above. Results of measurements on pure ferrite, and on ferritic-pearlitic surfaces are indicated. Tables, graphs, and micrographs. 14 ref.

Miscellaneous Publications

8765 F-3 Lead Alloy Cable Sheath—Effect of Bending and Creep on Life. L. F. Hickernell, A. A. Jones, and C. J. Snyder. *Transactions of the American Institute of Electrical Engineers,* v. 70, pt. 2, 1951, p. 1273-1280; disc., p. 1280-1285. (TK1 Am35tr)

Details of extensive experimental investigation of mechanical properties of above arsenical Pb alloy as compared with other cable-sheath alloys. Graphs, tables, and macrographs.

8766 Fatigue Strengths of 14S-T4 Aluminum Alloy Subjected to Biaxial Tensile Stresses. Joseph Marin and W. P. Hughes. National Advisory Committee for Aeronautics, Technical Note 2704, June 1952, 24 pages. (TL570 Un3t)

Effect upon fatigue strength of varying ratios of biaxial stresses was studied. The biaxial fatigue stresses were produced by applying simultaneously a pulsating internal pressure and a fluctuating axial tensile load to a thin-walled tubular specimen. Dynamic loads were applied by a specially designed testing machine. Results show that fatigue strength is greatly affected by anisotropy.

Books

8767 Engineering Materials; Their Mechanical Properties and Applications. Joseph Marin. 491 pages. 1952. Prentice-Hall, New York. (TA405 M33e)

Mechanical properties of materials, their definition, determination, and utilization are treated in Part One. In the general treatment of mechanical properties, static, fatigue, impact, and high- and low-temperature loading conditions are considered. The behavior of materials under various types of loading conditions such as tension, compression, bending, and torsion are treated. Utilization of mechanical properties in simple machine and structural design problems is strongly emphasized. In Part Two, a brief treatment of a number of important engineering materials is given. Emphasis is placed on mechanical properties and factors influencing them. Part Three describes the more important testing machines and strain gages used for determination of mechanical properties. Problems and references.

See also:

8433 (mechanical properties of Mg-alloy castings)
8434 (mechanical properties of superalloys)
8443 (nodular cast iron—Swedish practices)
8450 (ductile cast iron)
8452 (mechanical properties of steel castings)
8475 (straightened mild-steel flat bars)
8493 (hardness and tensile strength of sintered Fe)
8496 (mechanical properties of Ti welds)
8501 (bend and tension tests of Al welds)
8502 (carbon-stainless welds)
8510 (bend tests on welded cast iron)
8514 (properties of butt welds in steel tubing)
8519 (argon-arc-welded duralumin)
8521 (welded low-alloy and carbon steel)
8530 (stress-strain properties in riveted and spot welded joints)
8531 (design stresses in fillet-welded joints)
8533 (analysis of welding stresses)
8535 (welds in 61S-T Al-alloy sheet)
8537 (fatigue strength of girders)
8553 (weld strength of Mg-alloy sheet)
8561 (heat treatment vs. strength of steel wire)
8563 (nitrided alloy steels)
8564 (precipitation-hardening stainless steels)
8572 (bend tests on steel plates)
8639 (high-temperature mechanical properties of austenite alloys)
8643 (slip shrinkage in metal-oxide mixtures and in B_4C)
8649 (deformation structures of β-phase uranium crystals)
8652 (deformation of Al)
8664 (effects of stresses on martensite transformation)
8777 (wear of metals)
8778 (Al and alloys)
8801 (spring steels)
8809 (mechanical properties of cable sheath)
8938 (mechanical testing—review)
8942 (wear in telephone switching apparatus)
8985 (strain-gage procedure)
9017 (special steels for railroad tie plates and clamps)
9021 (spring materials—mechanical properties)
9196 (British symposiums on friction)
9199 (wear and friction with boundary lubrication)

14. CORROSION

8768* On the Tantalum—Oxygen System. (In English.) Stig Lagergren and Arne Magneli. *Acta Chemica Scandinavica*, v. 6, no. 3, 1952, p. 444-446.

Starting materials for the investigation were Ta powder and Ta_2O_5, weighed amounts of which were intimately mixed, pressed, and heated in vacuo. The products were investigated by taking X-ray powder photographs.

8769* The Interaction of Iron With Ozone. (In Russian.) R. Kh. Burshtein and N. A. Shumilova. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 251-252.

A study was made of the formation of oxide films on iron specimens by ozone. Data are tabulated and charted.

8770* The Chromium Impoverishment of Grain Boundaries as a Cause of Intercrystalline Corrosion of Stainless Steel. (In Russian.) I. A. Levin. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 701-704.

Corrosion tests on low-carbon Fe-Cr alloys indicate that intercrystalline corrosion is not due to Cr impoverishment. Tables and graphs.

8771* Irreversible Electrode Potentials of Iron in Electrolytes Containing Corrosion Inhibitors. (In Russian.) I. L. Rozenfel'd. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, Nov.-Dec. 1951, p. 674-677.

A study was made of the above in electolytes containing sodium nitrite and zinc sulfate as inhibitors. Data are charted.

8772* An Example of Good Performance of Architectural Light-Metal Parts. (In German.) H. Neunzig. *Aluminium*, v. 28, May 1952, p. 150-152.

Signboard of anodized Al-Mn with letters of anodized Al-Mg-Si, exposed to a marine atmosphere for 14 years. Appearance of the latter was very satisfactory; that of the former, anodized in a thinner layer, was less satisfactory.

8773* Use of Magnesium Anodes in Cathodic Protection of Tanks and Pipelines. L. E. Magoffin. *Journal, American Water Works Association*, v. 44, May 1952, p. 407-412.

Experiences of California Water & Telephone Co. Although the overall cost is slightly higher than that of rectifier-type cathodic protection, ease of handling and adaptation more than offset additional cost.

8774* Corrosion and Cathodic Protection of Pipelines. W. R. Schneider. *Journal, American Water Works Association*, v. 44, May 1952, p. 413-426; disc., p. 427.

Confined to installations of continuous steel pipelines under water or in soil at normal soil temperature. Gives details of test procedures and protective methods (electrical or by use of graphite or Mg anodes.)

8775* Cathodic Protection of Steel Water Tanks. C. Kenyon Wells. *Journal, American Water Works Association*, v. 44, May 1952, p. 428-434.

Procedures and experiences of Long Beach Water Dept., Long Beach, Calif. They indicate that cathodic protection of the interior surfaces of steel water-storage tanks is limited to those areas below the average high-water line. It still remains necessary to protect those areas above this level with some type of coating. Use limited to non-ice-forming months of the year.

8776 Oxidation of Alloys by the Wire Life Test Method. Anton deS. Brasunas and Herbert H. Uhlig. *ASTM Bulletin*, May 1952, p. 71-75.

Gives advantages, disadvantages, and results of above method for rapid evaluation of alloys and various metal surface treatments for high-temperature oxidation. Wires were chiefly of Cr-Fe and Ni-Cr alloys. Tables, graphs, and photographs.

8777* The Engineering Aspects of Intimate Metallic Surfaces. H. E. Arblaster. *Australasian Engineer*, Mar. 7, 1952, p. 43-58.

Discusses following topics: cavitation erosion, covering mechanism, effect of some variables, testing cavitation resistance; metallic wear, covering galling, scuffing, etc.; problems of metallic surfaces nominally at rest; problems of surfaces in motion; friction and frictional resistance of metals; lubrication by thin metallic films; surface films; boundry lubrication; extreme pressure lubricants; and fretting corrosion and variables affecting it. Tables and photographs. 34 ref.

8778 Aluminum. R. L. Horst. *Chemical Engineering*, v. 59, May 1952, p. 300, 302, 304, 306, 308-310, 312-314, 316.

Corrosion resistance of aluminum and its alloys to over 100 common corrosives—with data on applications, composition, and mechanical properties.

8779 Cast Alloy Reference Sheet. N. S. Mott. *Chemical Engineering Process* (Engineering Section), v. 48, May 1952, p. 266.

Emphasis is on chemical corrosion resistance of 65%-Ni, 32%-Cu (cast Monel) alloy. Mechanical and physiacl properties, machinability, heat treatment, weldability, and applications are also listed.

8780* The Anodic Oxidation of Platinum at Very Low Current Density. S. E. S. El Wakkad and Sayeda H. Emara. *Journal of the Chemical Society*, Feb. 1952, p. 461-466.

Above reaction carried on in acid, neutral, and alkaline solutions by the direct potentiometric method, using a special cell and constant current unit.

8781* Condensed Phosphates and Corrosion Control. B. Raistrick. *Chemistry & Industry*, May 10, 1952, p. 408-414.

Discusses use of above compounds for controlling corrosion of both ferrous and nonferrous metals. Considers mechanism of corrosion and of inhibitors; cathodic and anodic control with condensed phosphates; tuberculation, pitting, and successful use of metaphosphate at low pH, and role of Ca in corrosion control. Presents results of X-ray and optical studies of orientation of calcite on steel, and of anodic and cathodic effects, using two methods. 23 ref.

8782 A Case History Involving Intergranular Failure of Stainless Steel Heater Tubes. G .A. Works. *Corrosion* (Technical Section), v. 8, June 1952, p. 217-221.

Failure of a number of Type 316 stainless-steel tubes in a fired heater at a phenol solvent-treating plant after 10 yrs. of service is outlined. Metallurgical investigations showed that carbide precipitation at the grain boundaries had occurred at about 750°F. Heat treatment was carried out on the uncracked tubes and they were re-installed in the heater. No further difficulty was encountered after 24 mos. Photomicrographs.

8783 Corrosion Problems in Ion Exchange Systems. J. F. Wilkes. *Corrosion* (News Section), v. 8, June 1952, p. 1-2.

Discusses a series of above problems.

8784* Better Connector Life Vital to the Use of Aluminum in Distribution. C. E. Baugh. *Electrical World*, v. 137, June 2, 1952, p. 82-85.

Unsatisfactory performance of present connectors in rural areas removed from coastal contamination indicates the problem may be universal, with location affecting only the timing. Illustrations show corroded connectors.

8785 Passivity of Iron in Nitric Acid. Harry C. Gatos and Herbert H. Uhlig. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 250-258.

Passivity of iron in HNO_3 was studied employing iron films evaporated on glass. Discusses influence of pre-exposure to various types of environments on the precise amounts of iron dissolving in HNO_3 before passivation reaction practically ceases. 13 ref.

8786 The Influence of Inhibitors on the Dissolution of Iron in Acid Solution. J. Elze and H. Fischer. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 259-266.

Presents and analyzes results of experiments on the above, showing differences in the mechanism of action of various types. Graphs and tables.

8787* Measuring Effectiveness of Rust-Preventive Oils. (In German.) Alexander Philippowich. *Erdöl und Kohle*, v. 5, Apr. 1952, p. 211-214.

Characteristics of above. Different methods of measuring rate of rusting of ferrous metals coated with different oils. Tables and graphs.

14. *Corrosion*

8788 Corrosion-Resisting Nickel Alloys and Chemical Progress. W. Z. Friend and F. L. LaQue. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 965-971.

Summary of the corrosion-resisting characteristics of the principal Ni-containing alloys. Examples are given of specific applications of these alloys in the manufacture of a number of chemical products, including products involving Cl, Br, Fe, and HF; synthetic textiles such as viscose rayon, cellulose acetate rayon, and nylon; dyestuff manufacture and textile dyeing and finishing; synthetic plastics such as phenolics, alkyds, polystyrene, and organic chloride polymers; antibiotics such as penicillin, streptomycin, and chloromycetin; fatty-acid products; and corn products. 84 ref.

7889 A Note on Filiform Corrosion. F. Hargreaves. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 47-48.

Above type of corrosion was induced on polished carbon-steel specimens exposed to the atmosphere. Corrosion tracks, originating from slag inclusions, developed after 24 hrs. exposure; they showed brilliant interference colors. Some filiform corrosion tracks also occurred on coated specimens. Illustrated.

8790 Correspondence on the Paper "Corrosion by Retained Treatment Chemicals on Phosphated Steel Surfaces," by S. G. Clarke and E. E. Longhurst. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 58.

Discussion by R. J. Brown of above paper (Jan. issue), plus authors' reply. Illustrates "snail-trail" and filiform corrosion.

8791* The Prevention of Corrosion in Packaging. I. The Use of Sodium Benzoate as a Corrosion-Inhibitor in Wrappings. II. Temporary Protectives From Rubber Latex and Other Aqueous Dispersions. III. Vapour-Phase Inhibitors. E. G. Stroud and W. H. J. Vernon. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 166-184.

These articles include details of experimental work on corrosion prevention of mild steel, cast iron, and nonferrous metals using a variety of the materials and techniques indicated in the subtitles, and under a variety of conditions. 19 ref.

8792 On the Cubic Law of Oxidation. J. T. Waber. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 734-735.

Experimental and theoretical studies are reviewed including that on Fe and Cu. Data for Ta and Ti are presented to indicate that this growth law may apply to more metals than suspected in the past. Graphs. 11 ref.

8793 Kinetics of Formation of Oxide Layer on Zinc. Walter J. Moore. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 764.

A theoretical discussion of the above, with mention also of copper oxidation.

8794 Precipitation of Colloidal Ferric Oxide by Corrosion Inhibitor Ions. W. D. Robertson. *Journal of Physical Chemistry*, v. 56, May 1952, p. 671-672.

The relative precipitating power with respect to a ferric oxide sol of anions employed as corrosion inhibitors was determined. Concludes that this power is not a significant factor in the corrosion-inhibition mechanism.

8795 Aluminum Corrosion Prevention. Part 1. George W. Orton. *Light Metal Age*, v. 10, Apr. 1952, p. 10-11, 33.

Brings together information and established procedures on the above. Part 1 considers aspects of direct chemical attack. (To be continued.)

8796 A Review of Information on the Effect of Impurities on the Corrosion Resistance of Aluminium. Part I. General Considerations. Part II. Aluminium. Part III. Wrought Alloys—Wrought Aluminium-Copper-Magnesium Alloys (Al-Cu-Mg). Part IV. Wrought Aluminium-Magnesium Alloys. Part V. Wrought Aluminium-Magnesium Silicide Alloys. Part VI. Wrought Aluminium-Manganese Alloys. Part VII. Wrought Aluminium-Zinc-Magnesium and Aluminium-Zinc-Magnesium-Copper Alloys. Part VIII. Cast Aluminium-Copper-Silicon and Aluminium-Magnesium Alloys. Part IX. Cast Aluminium-Silicon Alloys. Part X. Cast Aluminium-Zinc-Magnesium Alloys. Marjorie Whitaker. *Metal Industry*, v. 80, Mar. 7, 1952, p. 183-186; Mar. 14, 1952, p. 207-212; Mar. 21, 1952; p. 227-230; Mar. 28, 1952, p. 247-251; Apr. 4, 1952, p. 263-266; Apr. 11, 1952, p. 288-289; Apr. 18, 1952, p. 303-305, 313; Apr. 25, 1952, p. 331-332; May 2, 1952, p. 346-350; May 9, 1952, p. 387-388.

175 references.

8797* The Oxidation of Liquid Tin. (In German.) Wolfgang Gruhl and Ursula Gruhl. *Metall*, v. 6, Apr. 1952, p. 177-182.

Describes experiments on the above made on pure Sn at temperatures of 325 and 600°C., and on Sn with up to 1% additions of Li, Na, Mg, Al, Zn, Cd, Sb, Pb, Bi, and Cu. The experimental results are interpreted, and show that only those metal additions which are less noble that Sn, with the exception of Cd, speed up the oxidation. In the case of Al, even as slight an addition as 0.5% will completely inhibit the oxidation of Sn. Tables, charts, and micrographs.

8798* Effect of Sonic and Ultrasonic Vibrations on Electrochemical Processes. (In German.) Albert Roll. *Metalloberfläche*, sec. B, v. 4, Apr. 1952, p. B49-B53; May 1952, p. B65-B70.

Research shows that ultrasonics may prevent as well as increase passivity of surface coatings. The qualitative effect of weak ultrasound is similar to mechanical stirring. Intense ultrasound changes or destroys passivation by cavitation and impairment of passivating coatings. Part II discusses effect of different factors on electrolytic separation of gases under influence of ultrasonics. Diagrams and graphs. 18 ref.

8799* Weathering of Sheet-Metal Building Material. *Technical News Bulletin* (National Bureau of Standards), v. 36, May 1952, p. 72-74.

Two-yr. atmospheric exposure tests of a number of sheet metals used in building construction have recently been completed by NBS. Sheets of Al and Zn alloys and of Al-coated and galvanized steel were exposed to the weather. Each metal tested was fastened to bare wooden boards with nails of various materials, both with and without Neoprene or lead sealing washers between the nail head and the sheet. Results are summarized. Illustrated.

8800* Control of Corrosion in Locomotive Diesel Engines. A. C. Mengel. *Railway Mechanical and Electrical Engineer*, v. 126, June 1952, p. 65-68.

Illustrations show appearance of corroded diesel-engine cylinder liners. Describes application of 4 preventive measures: proper maintenance of SO_4-CO_3 ratio; maintenance of proper ratio of $NaNO_3$ to alkalinity in feedwater; use of steel of lower tensile strength in boiler construction, so that stresses at grain boundaries are lower; and adoption of the all-welded, stress-relieved boiler. Use of chromates in the cooling water is also discussed.

8801* The Spring Steels, Their Development, Properties, and Aplications. (In German.) Sepp Ammareller. *Stahl und Eisen*, v. 72, Apr. 24, 1952, p. 475-488; disc., p. 488-489.

Gives results of scaling tests and alternating-stress tests. Effects of surface finish, corrosion, and cross section of specimen were studied. Describes manufacture, heat treatment, and applications of the springs. Graphs, diagrams, and tables. 30 ref.

8802* Resistance to Intergranular Corrosion of Ferritic and Martensitic Stainless Chromium Steels. (In German.) Eduard Houdremont and Walter Tofaute. *Stahl und Eisen*, v. 72, May 8, 1952, p. 539-545.

Investigation of stainless steels with 15-30% Cr with or without additions of Mo, Al, Si, P, Ti, Ta, Cl, and V regarding their tendency to intergranular corrosion, their hardness and structure. Carbide precipitation as a cause of intergranular corrosion. Modification of the theory of chromium impoverishment. Tables and graphs.

8803* Variation of Corrosion by Wetting Agents. III. Influence of the Constitution of Cation-Active Wetting Agents. Luigi Piatti. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 186-188.

In earlier communications it was shown that the presence of wetting agents can prevent pitting action of tap water on unalloyed steel. An anion-active and several non-ionic wetting

agents were found to be suitable. Two cation-active wetting agents, examined under similar conditions gave, in one case, practically total protection of the steel; in the other, attack was stronger than by water without admixture. Both the products were derived from the same mono-acetylated diamine. Surface tensions were only slightly different. Since chemical constitution is apparently of decisive importance, use of only tested wetting agents is recommended.

8804* Definitions and Mechanism of Passivity. (In German.) Roberto Piontelli. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 188-192.

Discusses internal factors; initial surface state; conditions of environment; operative conditions; and specific properties of compounds which form protective layers.

8805* Influence of Composition of Stainless Steel on Resistance to Sulfuric and Hydrochloric Acids. (In German.) Karl Bungardt and Hans Joachim Rocha. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 209-211.

Discusses above, showing changes of corrosion resistance with composition by means of 2- and 3-dimensional graphs. Two groups are distinguished on the basis of passivity characteristics.

8806* Prediction of the Appearance of Rust Damage in Warm-Water Plants. (In German.) Günther Seelmeyer. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 211-217.

According to recent experiences, formation of internal corrosion and scaling in waterworks equipment does not depend—as generally assumed—entirely on chemical nature of the water. Effects of kind and quality of materials used and of construction and operation of the plants are also important. Attempts to clarify these factors and to give more exact definitions of the concepts of aggressive, scale-forming, and non-scale-forming waters. Tables.

8807* Influence of Stress and Temperature in Stress-Corrosion Experiments. (In German.) Otto Lissner. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 147-150.

Discusses the justification for the plotting of log-log coordinates for stress dependence of life duration of test pieces exposed to stress-corrosion. Temperature dependence and permissible temperature increase in stress-corrosion experiments is indicated. Data are charted for steels and Al alloys. 14 ref.

8808* Corrosion of Iron by Benzene Solutions of Iodine. (In Russian.) L. G. Gindin and M. V. Pavlova. *Zhurnal Prikladnoi Khimii*, v. 24, Nov. 1951, p. 1151-1155.

Laboratory tests were made on the above. Apparatus and method are described. It was found that FeI_2 is first formed and is then transformed to Fe_2O_3, liberating the iodine for further attack. Data are tabulated.

Miscellaneous Publications

8809 Bell System Cable Sheath Problems and Designs. F. W. Horn and R. B. Ramsey. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1811-1816. (TK1 Am35tr)

A general discussion. Covers mechanical, electrical, and corrosion problems.

8810 Potential and Passivity. (In French.) A. Rius and A. S. Terol. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 202-203; disc., p. 203-204. (QC311 C73c)

Presents a resume of an article on the above which discusses the various concepts relative to passivity, electrode potential, and corrosion of Fe. Includes graphs.

8811 Methods of Studying Corrosion Inhibtors and Activators. (In French.) L. Cavallaro and A. Indelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 205-217; disc., p. 218. (QC311 C73c)

Discusses the above with respect to mechanism, methods for determining intensity of the protective and stimulating action, and methods of calculating their effects for practical usage. Includes tables. 37 ref.

8812 Remarks on Corrosion and Passivation of Metals. (In French.) M. Pourbaix and P. Van Rysselbergh. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 219-229; disc., p. 230-231. (QC311 C73c)

Discusses the above with respect to the behavior of soft steel in an aqueous bicarbonate solution, behavior of an 18-8 Cr-Ni steel in an acetic acid solution; and behavior of 18-8-2 Cr-Ni-Mo steel in an acetyl chloride solution. Includes schematic drawing, graphs, and tables.

8813 The Oxidation of Metals and Alloys. Erich Scheil. National Advisory Committee for Aeronautics, Technical Memorandum 1338, June 1952, 16 pages. (Translated from *Zeitschrift für Metallkunde*, v. 29, July 1937, p. 209-214.) (TL570 Un3tm)

Discusses mechanism of the above, citing evidence from the literature in verification of the theory postulated for oxidation and for formation of layers resistant to further oxidation. 29 ref.

8814 Atmospheric Exposure Tests of Nailed Sheet Metal Building Materials. Theodore H. Orem. National Bureau of Standards, Building Materials and Structures Report 128, Mar. 28, 1952, 24 pages. (TA401 Un3b)

Tests of nailed metallic building sheets of Al, Al alloy, Al-coated steel, galvanized steel, and Zn alloy exposed for 2 yrs. to the atmospheres of Washington, D. C., and Hampton Roads, Va., are described. The tests indicate that improper installation practices can cause accelerated corrosion of such materials. Important conclusions and recommendations are given regarding the installation procedures. Tables, micrographs, and macrographs.

See also:

8434 (corrosion-resistance of super-alloys)
8502 (carbon-stainless welds)
8581 (corrosion of gasoline storage tanks)
8606 (film formation on metals)
8688 (tarnishing at metal-Se boundary)
8694 (corrosion-inhibitor mechanisms)
8695 (polarization phenomena of metals)
8725 (corrosion resistance of Mg-Zr—rare earth metals)
8746 (stress corrosion of aircraft-engine exhaust valve)
8751 (corrosion resistance of high-Ni alloys)
8752 (chemical attack vs. friction)
8760 (stress-corrosion effects on materials)
8905 (aqueous corrosion—oxygen effects)
9021 (spring materials—corrosion resistance)
9025 (stability of Pb anodes in sulfate solutions)
9110 (corrosion in gas turbines)
9261 (corrosion-prevention in cooling towers)
9368 (oxide film formation on Hg)
9403 (corrosion behavior of Pb)
9404 (corrosion behavior of Ag)
9405 (corrosion behavior of Zn)

15. ANALYSIS—CHEMICAL AND PHYSICAL

8815* Method of Accurate Detection and Microdetermination of Copper in Solids at Different Stages of Preparation of Luminescent Substances. (In French.) Edmond Grillot. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 28, 1952, p. 1775-1777.

After long exposure in the Chatillon pile, all solids contain a quantity of Cu^{64} proportional to their total Cu content. This technique is used for the determination. Limit of detection is 10^{-8} g. of Cu.

8816* Contribution to Spectrographic Examination of Metal Foil. (In German.) G. Rätze. *Aluminium*, v. 28, May 1952, p. 152.

Fabrication of electrodes by briquetting foil or strip. Illustrated.

8817 A Method For Simultaneous Determination of Carbon-14 and Total Carbon. Donald L. Buchanan and Akira Nakao. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2389-2395.

The carbon analysis is carried out by wet oxidation with subsequent purification of CO_2 in a vacuum system. CO_2 is measured manometrically and then transferred to a proportional

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gas counter for C^{14} determination. Particularly suitable for biological investigation. 16 ref.

8818 An Improved Carbon-14 Wet Combustion Technique. John H. Weisburger, Elizabeth K. Weisburger, and Harold P. Morris. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2399-2400.

Modified wet-oxidation procedure for organic material and its application to analysis of C^{14}-labeled substances.

8819* Infrared Spectra of Some Rock-Forming Minerals. W. D. Keller, John H. Spotts, and Donald L. Biggs. *American Journal of Science*, v. 250, June 1952, p. 453-471.

Absorption spectra of some common carbonates, sulfates, phosphates, and silicates are described. Spectrograms. 19 ref.

8820* Medicolegal Application of Blood Grouping Tests. *Journal of the American Medical Association*, v. 149, June 14, 1952, p. 699-706.

Summarizes developments of last 15 years on above, giving information useful in analysis of blood.

8821* Rapid X-Ray Quantitative Analysis of Crystalline Powders With Particular Reference to Titanium Dioxide Pigments. W. Hughes and H. Smith. *Analyst*, v. 77, Apr. 1952, p. 179-185.

A simple X-ray diffraction camera is described, the action of which is based on the flat powder-layer method. Specimen preparation is simplified, and where large numbers of specimens are involved, there is considerable saving of time in processing the film. Accuracy with rutile-anatase mixtures is about ±2.5%. A 2nd method of quantiative analysis by means of a Geiger-counter X-ray spectrometer is described. Accuracy with rutile-anatase mixtures is probably better than ±1%.

8822* The Analysis of Zinc Residues. E. F. Pellowe and F. R. F. Hardy. *Analyst*, v. 77, Apr. 1952, p. 208-210.

A rapid chemical method for Zn residues containing metallic Zn, ZnO, and $ZnCl_2$.

8823* The Grammar of Units of Biological Activity. N. T. Gridgeman. *Analyst*, v. 77, May 1952, p. 239-245.

A general discussion on bio-assay.

8824* The Micro-Determination of Magnesium in Plant Materials With 8-Hydroxyquinoline. J. Davidson. *Analyst*, v. 77, May 1952, p. 263-268.

Amounts of Mg from 20 to 200μg in 1-4 ml. of solution can be estimated with an accuracy of ±1μg. Tables and graphs. 19 ref.

8825* The Separation of Silver From Copper by Electro-Deposition From Ammoniacal Solution. Harvey Diehl and John P. Butler. *Analyst*, v. 77, May 1952, p. 268-272.

An improved method, found successful for analysis of Ag solder.

8826* Iodometric Determination of Selenium by Arsenious Oxide. G. S. Deshmukh and B. R. Sant. *Analyst*, v. 77, May 1952, p. 272-273.

8827* An Extraction Procedure for the Isolation of Copper. (In English.) Philip W. West, Thomas G. Lyons, and Jack K. Carlton. *Analytica Chimica Acta*, v. 6, May 1952, p. 400-405.

Butyraldehyde-butyric acid, benzene-butyric acid, and ethyl acetate-capric acid were investigated as solvent systems for the extraction. It was found that optimum extraction occurred at a pH between 6.3 and 10.3.

8828* The Extraction of Lead Iodide by Methyl Iso-Propyl Ketone. (In English.) Philip W. West and Jack K. Carlton. *Analytica Chimica Acta*, v. 6, May 1952, p. 406-411.

A method is proposed for isolation of Pb by solvent extraction.

8829* Use of Butyl Phosphate in Steel Analysis. I. Determination of Aluminum. (In English.) Manuel Aven and Henry Freiser. *Analytica Chimica Acta*, v. 6, May 1952, p. 412-415.

Deals with extraction of Fe as the thiocyanate complex with n-butyl phosphate. Conditions for optimum Fe extraction were investigated. The technique was successfully applied to determination of Al in steel.

8830* The Alkalimetric Determination of Nitrate Ion By Means of a Copper-Catalysed Reduction. (In English.) Zoltán G. Szabó and Lajos G. Bartha. *Analytica Chimica Acta*, v. 6, May 1952, p. 416-419.

8831* The Microchemical Analysis of Ferrous and Non-Ferrous Alloys. (In English.) G. W. C. Milner and W. R. Nall. *Analytica Chimica Acta*, v. 6, May 1952, p. 420-437.

Satisfactory methods are described for determination of certain of the alloying constituents in small quantities of steels, Al alloys, and white metals. In steels, Pb is determined by extratcion with dithizone. In Al alloys, absorptiometric procedures are recommended for determining Cu, Ni, Fe, and Mn. Determination of Si is advocated by the absorptiometric technique. For the determination of Sb in white metals, a microvolumetric procedure with standard $KBrO_3$ is recommended using α-naphthaflavone as indicator. 11 ref.

8832* A New Colorimetric Reagent for Molybdenum. (In tán G. Szabó and Lajos G. Bartha. *Analytica Chimica Acta*, v. 6, May 1952, p. 450-451.

Disodium-1,2-dihydroxybenzene-3,5-disulfonate ("Tiron") gives a bright yellow color with Mo^{+6}. Under optimum conditions sensitivity is about 1 part of Mo in 10,000,000 parts of solution.

8833* The Determination of Microgram Amounts of Sulphur in Nitrate or Chloride Solutions. (In English.) D. S. C. Polson and J. D. H. Strickland. *Analytica Chimica Acta*, v. 6, May 1952, p. 452-461.

8834 The Determination of Microgram Amounts of Beryllium Using Acetyl Acetone. (In English.) J. A. Adam, E. Booth, and J. D. H. Strickland. *Analytica Chimica Acta*, v. 6, May 1952, p. 462-471.

Absorptiometric procedure. Graphs and tables.

8835* Quantitative Analysis by Electro-Chromatography On Paper. I. The Separation and Gravimetric Determination of Copper. (In English.) J. R. A. Anderson and M. Lederer. *Analytica Chimica Acta*, v. 6, May 1952, p. 472-475.

Apparatus diagram and tables.

8836* Chromatographic Analysis of Mineral Oils. (In English.) C. Boelhouwer, A. J. van Riemsdijk, J. van Steenis, and H. I. Waterman. *Analytica Chimica Acta*, v. 6, May 1952, p. 476-482.

Simple fraction collector for chromatographic work was used in analysis of a number of oil fractions, allowing a separation in 3 main groups, containing respectively, nonaromatic, monoaromatic and diaromatic compounds. Diagram, tables, and graphs. 14 ref.

8837* Some Applications of Solubility Theory to Analytical Problems. Joel H. Hilderbrand and George J. Rotariu. *Analytical Chemistry*, v. 24, May 1952, p. 770-773.

Solutions are classified as ideal, regular, athermal, non-ideal, associated, and solvated. These criteria are applied to partition and chromatography with a variety of illustrations.

8838 New Development in Solid Phase Infrared Spectroscopy. J. D. Sands and G. S. Turner. *Analytical Chemistry*, v. 24, May 1952, p. 791-793.

Lamination and impregnation techniques, using material that has transparent regions in the infrared, were developed. Mica, polythylene, and silver chloride were found suitable. Quantitative applications include determining bound acrylonitrile in butadiene-acrylonitrile copolymers, determination of aromatic-ring concentration, and studies of ratio of methyl to methylene groups. Determination of bound acrylonitrile is described. Statistical analysis of results indicates that reproducibility is comparable to that of liquid- and gas-phase methods.

8839 Emission Spectrographic Analysis of Organic Solids for Inorganic Constituents. Geo. V. Alexander and Ralph E. Nusbaum. *Analytical Chemistry*, v. 24, May 1952, p. 793-795.

Procedure for determination of Na, K, Ca, Mg, Ba, Fe, and P is described. Range of analysis is 2-18% for P and 0.02-6% for each of the other elements. Proved satisfactory for analysis of mono- and polysaccharides and their derivatives. 15 ref.

8840 Chemical Analysis With High-Frequency Electrodeless Discharge; High-Frequency Excitation With Emission Spectrograph as a Means of Studying Halogen Compounds. Robert E. Keller and Lothrop Smith. *Analytical Chemistry*, v. 24, May 1952, p. 796-799.

8841 Optical Spectrophotometric Analysis of Hydrogen-Deuterium Mixtures in Presence of Air. Herbert P. Broida and Gerry H. Morgan. *Analytical Chemistry*, v. 24, May 1952, p. 799-804.

An electrodeless discharge at 150 mc. in a continuous-flow gas system is used in conjunction with a high-resolution photoelectric grating monochromator. Each of the components can be determined to better than 0.1% of the total mixture. The method can probably be extended to other gaseous and voltaile mixtures.

8842 Rapid Spectrophotometric Determination of Silicon and Manganese in Cast Iron. John R. Boyd. *Analytical Chemistry*, v. 24, May 1952, p. 805-807.

Determination of above elements in a single weighed sample in about ⅓ the time necessary by gravimetric and volumetric means. Accuracy compares favorably with former methods. The procedure is of value to cast-iron foundries which have a high melting rate and where changes of composition might cause heavy losses if not quickly corrected. 21 ref.

8843 Calculator for Spectrochemical Analysis; Application of Seidel Function of Density in Its Development. George Oplinger. *Analytical Chemistry*, v. 24, May 1952, p. 807-812.

Calculator developed makes use of fixed photographic emulsion calibration scale, with provisions for operation at any contrast within the limits of the emulsion for determination of analytical data. Tables, graphs, and illustrations. 24 ref.

8844 Separation of Manganese from Aqueous Solutions Using a Mercury Cathode. Bruce McDuffie and Leven S. Hazlegrove. *Analytical Chemistry*, v. 24, May 1952, p. 826-829.

Mn was quantitatively deposited from sulfate, sulfite-sulfate, and oxalate-sulfate media. Changes in pH during electrolysis were observed and explanations offered. Suggests that the technique might serve as the basis of methods for removal or determination of Mn. 12 ref.

8845 Analysis of the System Methanol—Ethylene Glycol—Water. Frank H. Conrad, M. C. Flint, R. H. Meyer, and J. W. Sjoberg. *Analytical Chemistry*, v. 24, May 1952, p. 837-840.

Mixtures of known composition were prepared and refractive index and density of each determined and used to plot a triangular diagram, used in rapid analysis. Tables and graphs.

8846 Fire Assay for Iridium. R. R. Barefoot and F. E. Beamish. *Analytical Chemistry*, v. 24, May 1952, p. 840-844.

Significant losses of Ir to basic slags were noted, although satisfactory collections of Ir could be made when neutral or acid slags were used. Two methods for analysis of Pb-Ir buttons are outlined. Losses of Ir during cupellation were confirmed. A detailed examination of efficiency of a fire assay for extraction of Ir from ores, also sources of error, are reported. 21 ref.

8847 Colorimetric Microdiffusion Determination of Chloride; Application to Chlorinated Insecticides. H. T. Gordon. *Analytical Chemistry*, v. 24, May 1952, p. 857-862.

Simpler, faster, and more sensitive colorimetric modification of the Conway microdiffusion analysis. It is applicable to many organic compounds containing Cl or Br. 25 ref.

8848 Estmation of Tenths of a Microgram of Copper by Its Catalytic Action on Autoxidation of Resorcinol. R. H. Lambert. *Analytical Chemistry*, v. 24, May 1952, p. 868-870.

8849 Titration of Quadrivalent Tellurium With Thiosulfate. Ralph A. Johnson and Donald R. Frederickson. *Analytical Chemistry*, v. 24, May 1952, p. 866-867.

8850 Fusion Method for Microscopic Identification of Inorganic Ions. Philip W. West and Lawrence Granatelli. *Analytical Chemistry*, v. 24, May 1952, p. 870-875.

By fusing inorganic salts with 8-quinolinol on a microscope hot stage, the following ions may be identified by studying color, morphology, and certain optical properties of the addition and chelate salts thus formed: nitrate, chloride, sulfate, copper, zinc, uranyl, calcium, chromium, and magnesium. Technique described permits simultanecus identification of cation, anion, and water of crystallization in a given organic salt.

8851 Microdetermination of Deuterium in Organic Compounds. Jack Graff and David Rittenberg. *Analytical Chemistry*, v. 24, May 1952, p. 878-881.

Samples of only 3-5 mg. are required. They are burned in a stream of dry O_2 and the water formed is reduced by hot Zn to yield hydrogen. Accuracy is equal to that of previous macromethods and time required is considerably shortened.

8852 Microdetermination of Nitrogen in Organic Compounds. W. C. Alford. *Analytical Chemistry*, v. 24, May 1952, p. 881-884.

The standard Dumas combustion tube is modified to permit combination of the combustion technique of the carbon-and -hydrogen train with the nitrogen isolation principle of the Dumas method. The time required for a complete analysis is about 40 min. Virtually all classes of N compounds have been analyzed successfully. 19 ref.

8853 Analytical Procedures for Ethyl Xanthate Labeled With Radiosulfur. A. M. Gaudin and John S. Carr. *Analytical Chemistry*, v. 24, May 1952, p. 887-889.

Alkali xanthates, especially the ethyl xanthates, are very widely used to separate minerals by flotation. Method described involves quantitative oxidation of xanthate sulfur to sulfate ion and quantitative precipitation of labeled sulfate as $BaSO_4$ of infinite radiochemical thickness. Various aspects of mineral-xanthate systems can be studied to advantage with radioactive xanthate. 10 ref.

8854 Precision Determination of Carbon in Metals by a High Frequency Combustion-Volumetric Method. Leonard P. Pepkowitz and Paul Chebiniak. *Analytical Chemistry*, v. 24, May 1952, p. 889-891.

Table shows accuracy and precision obtained with standard steels. Also applicable to other metals.

8855 Spectrophotometric Study of Cadmium-1,10-Phenanthroline System. Coe Wadelin and M. G. Mellon. *Analytical Chemistry*, v. 24, May 1952, p. 894-896.

Above study made to determine the feasibility of using the system for determination of Cd.

8856 Spectrophotometric Method for Mercury. Ray U. Brumblay. *Analytical Chemistry*, v. 24, May 1952, p. 905-907.

8857 Microdetermination of Sulfur Using the Grote Combustion Apparatus; Combustion of Sulfanilamide. O. E. Sundberg and G. L. Royer. *Analytical Chemistry*, v. 24, May 1952, p. 907-908.

8858 Congress of Practical Polarography. *Analytical Chemistry*, v. 24, May 1952, p. 914-917.

Abstracts of papers presented at above meeting, arranged by the Central Polarographic Institute of Prague, and held Feb. 18-19, 1952, in Bratislava, Slovakia.

8859* Determination of the Chemical Content of Refractory Materials by Means of Spectroscopic Analysis. (In German.) Gerhard Hartleif and Heinz Kornfeld. *Archiv für das Eisenhuttenwesen*, v. 23, Mar.-Apr. 1952, p. 103-105.

Describes a rapid method for spectroscopic determination of the constituents of quartzites and raw silica.

8860* A Rapid Method for Determination of the Chemical Content of Metallurgical Slags by Means of Spectroscopic Analysis. (In German.) Gerhard Hartleif and Heinz Kornfeld. *Archiv für das Eisenhuttenwesen*, v. 23, Mar.-Apr. 1952, p. 107-110; disc., p. 110-111.

Describes above method for determination of Ca, Fe, Mn, Mg, Al, Ti, V, and Si in furnace slag. Details of the experiments are indicated; amount of error is discussed. Tables and graphs.

8861* Report on Microanalytical Determination of Nitrogen. (For N-N, NO and NO_2 Linkages.) C. L. Ogg and C. O. Willits. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 288-291.

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8862* Report on Microanalytical Determinations of Bromine and Chlorine. Al Steyermark and Marian B. Faulkner. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 291-304.

Extensive tabular data obtained by various cooperators, using catalytic, Carius, and Parr bomb method. Conclusions.

8863* Report on Microanalytical Determination of Sulfur. C. L. Ogg. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 305-317.

Extensive tabular and graphical data obtained by various cooperators, using catalytic, Carius, and Parr bomb methods. Statistical analysis of the data.

8864* Report on Zinc in Plants. Eunice J. Heinen and Erwin J. Benne. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 397-398.

Evaluation of AOAC photometric procedure.

8865* Report on Copper and Cobalt in Plants. Kenneth C. Beeson. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 402-406.

Collaborative study of analytical procedure for the above.

8866* Report on Spectrographic Methods. W. T. Mathis. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 406-418.

Comparison of actual levels and consistency of results obtained by chemical, spectrographic, and flame-photometer methods for analysis of plants as standardized and run in different laboratories. Tables.

8867* A Manometric Adaptation for the Rapid Microbiological Assay of Vitamins and Amino Acids. William H. Stahl. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 469-478.

8868* A New Chemical Approach to the Determination of Vitamin B_6. James P. Sweeney and Wallace L. Hall. *Journal of the Association of Official Agricultural Chemists*, v. 35, May 15, 1952, p. 479-483.

Photometric, colorimetric procedure. 14 ref.

8869* Routine Determination of Small Amounts of Silicates and Phosphates in Biological Materials. (In Russian.) V. A. P'iankov and E. G. Margolis. *Biokhimiia*, v. 17, Jan.-Feb. 1952, p. 39-43.

Describes photocolometric method for the above. Test data are tabulated.

8870* Methodical Improvement of Processes for Determining Sulfur. (In German.) Walter Radmacher. *Brennstoff-Chemie*, v. 33, Apr. 23, 1952, p. 129-135.

Discusses systematic research results on the determination of sulfur contents of fuels. Tables, graphs, and photographs.

8871* Volumetric Determination of Anthracenes in Tar Oils and Tar-Oil Fractions. (In German.) W. Schmidt. *Brennstoff-Chemie*, v. 33, May 14, 1952, p. 176-179.

Describes improvement of the maleic anhydride method which makes it possible to determine amounts of anthracene and its homologues as low as 2% with an accuracy of ±0.3%.

8872* Quantitative Spectrographic Analysis of Slags. W. J. Price. *British Cast Iron Research Association Journal of Research and Development*, v. 4, Apr. 1952, p. 315-335.

Method for the spectrographic analysis of slags which can be generally applied in routine analysis. By this method, all the metallic oxide constituents of a single slag may be estimated in about 2 hrs. with an accuracy of 3%. Short survey of "rapid" slag-control methods and a review of spectrographic literature related to the problem, followed by a description of the work done in developing the recommended method. 39 ref.

8873 The Quantitative Determination of the Free Monoxides of Calcium, Strontium, and Barium and of Calcium Ethylate by the Alcohol-Glycerol Method. E. G. Swenson and T. Thorvaldson. *Canadian Journal of Chemistry*, v. 30, Apr. 1952, p. 257-267.

Also considers effect of accelerators and the inhibiting action of $MgCl_2$ on the process.

8874 Ultramicroanalysis. Past, Present and Future. *Chemical Age*, v. 66, Apr. 12, 1952, p. 543-546; Apr. 19, 1952, p. 569-572.

8875* Inorganic Chromatography on Cellulose. Part XI. A Study on the Separation of Tantalum from Niobium and its Application to Quantitative Analysis. F. H. Burstall, Patricia Swain, A. F. Williams, and G. A. Wood. *Journal of the Chemical Society*, Apr. 1952, p. 1497-1504.

Describes a new method for the separation of Ta and Cb from each other and from certain other metals. Method is based on their extraction in turn as fluorides, by ethyl methyl ketone in the presence of cellulose adsorbent. The method was applied to separation of earth acids from their mixtures with other metal ions, and to determination of Cb and Ta in minerals and alloys.

8876* Trace Determination of Zn in Zin-Cadmium Alloys. (In German.) Walter Scheller and W. D. Treadwell. *Helvetica Chimica Acta*, v. 35, no. 3, 1952, p. 754-762.

Describes spectrographic determination of Zn in Cd, potentiometric titration of Zn with potassium ferrocyanide, and polarographic determination of Zn in highly dilute Zn-Cd sulfate solutions. Tables and graphs. 17 ref.

8877* Spectroanalytical Determination of Low Silver Contents in Lead. (In German.) W. D. Treadwell, E. Amrein, and A. E. R. Bodmer. *Helvetica Chimica Acta*, v. 35, no. 3, 1952, p. 765-770.

Results of experiments show that aging the Ag-Pb alloys greatly reduces the blackening values and the hardness of the alloys. Observed phenomena are explained and data are charted.

8878* Multiple-Step Polarograms. I. (In German.) Paul Rüetschi and G. Trümpler. *Helvetica Chimica Acta*, v. 35, no. 3, 1952, p. 1021-1030.

A theory on above is developed on the basis of reduction of hydrogen ions at an electrode surface. Quantitative formulas for form and height of stage are derived and experimentally tested on azobenzene. Diagrams, graphs, and tables. 21 ref.

8879 Metallurgical Nickel Analysis. W. D. Mogerman. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 971-973.

Historical review is given of analytical difficulties that delayed general recognition of Cronstedt's discovery of Ni. The methods most widely used in metallurgical laboratories for determining Ni in both small and large quantities are discussed. Some practical hints are proposed for eliminating certain sources of error in gravimetric work.

8880 How to Analyze Tin-Bronze Alloys. C. Goldberg. *Iron Age*, v. 169, May 29, 1952, p. 86-87.

Recommended procedures for sampling and determination of Sn, Pb, Cu, Fe, Ni, Zn, P, Si, Al, and Mn.

8881 Determination of Molybdenum in Iron and Low-Alloy Steels Containing up to 0.5% of Tungsten. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 75-80.

Method is based on preliminary separation of Mo from Fe and from most of the other common alloying elements as the α-benzoinoxime complex. 11 ref.

8882 Determination of Vanadium in Carbon and Low-Alloy Steels and Irons. *Journal of the Iron and Steel Institute*, v. 171, May 1952, p. 81-85.

Cupferron and mercury-cathode separation were investigated and potentiometric end-point detection examined. Interference of alloying elements was studied. A recommended method for direct titration is described in detail, and tables of results on specially selected steels are included.

8883* The Absorptiometric Determination of Small Amounts of Tin In Titanium Pigment. F. R. Williams and J. Whitehead. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 213-216.

H_2S is recommended for precipitating Sn, in the presence of

Cd, from acid tartrate solution of Ti. The resulting sulfides can be dissolved in acid and the color produced by interactions between Sn and dithiol can be measured on a photoelectric absorptiometer if Teepol X is added to produce an efficient dispersion. This system obeys Beers' Law up to a concentration of Sn of at least 16 μg. per ml. 13 ref.

8884* A Note on the Quantitative Estimation of Zinc With Anthranilic Acid. K. Parthasarathy and K. Neelakantam. *Journal of Scientific & Industrial Research*, v. 11B, Apr. 1952, p. 158-159.

Data are tabulated.

8885 An Absorptiometric Analytical Procedure of Particular Applicability to the Residues Which Result From the Chlorination of Steel. S. Greenfield and L. E. Sparrow. *Metallurgia*, v. 45, May 1952, p. 263-266, 270.

Graphs and table.

8886* Microdetermination of Aluminum as Oxinate. (In English.) M. C. Alvarez Querol. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 2, 1952, p. 121-125.

A revised method is proposed. Modification of the procedure of Benedetti-Pichler yields results which are closer to theoretical values.

8887* Manganometric Microtitration of Iron. (In English.) M. C. Alvarez Querol. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 2, 1952, p. 126-132.

Certain methods of estimating very small amounts of Fe (about 4 mg.) in HCl solution were tested. The best results were obtained by manganometric titration of a solution reduced by $SnCl_2$. 10 ref.

8888* A New Procedure for Gravimetric Microdetermination of Carbon and Hydrogen. (In German.) Gerald Kainz. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 2, 1952, p. 166-175.

Nitrogen oxides produced by combustion of nitrogenous materials are removed by metallic Cu. Trials with various N_2-O_2 mixtures as combustion gases showed that even a relatively low addition of O_2 is sufficient to oxidize most organic substances. The combustion products are passed over a bed of copper oxide–lead dichromate. 47 ref.

8889* Determination of Very Small Amounts of Iron Impurities in Pure Copper. (In German.) A. Gottlieb. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 2, 1952, p. 176-186.

Describes colorimetric procedure using o-phenanthroline. Claimed to be very accurate, rapid, and sensitive. 11 ref.

8890* Specific Reagents for Germanium. (In French.) P. Bévillard. *Mikrochemie vereinigt mit Mikrochimica Acta*, v. 39, no. 2, 1952, p. 209-215.

Discusses a series of organic compounds of possible interest for determination of Ge. Gives structural formulas.

8891* Nitric Acid. X. Methods of Gas Analysis in the System N_2-NO-NO_2, N_2O_4-N_2O_3-HNO_2-HNO_3. (In German.) A. Klemenc. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 334-345.

Critically discusses and evaluates 4 methods for analysis of gaseous mixtures of above compounds. None are completely satisfactory for HNO and HNO_3 in presence of the nitrogen oxides. 10 ref.

8892* Analytical Application of Trithiocarbonic Acid. II. Determination of Zinc. (In German.) W. Pilz. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 471-477.

Describes experiments, results of which show the superiority of the above over H_2S in precipitation of Zn. Data are tabulated. 25 ref.

8893* The Precipitability of Iridium and Rhodium and Separation of Palladium From Iridium With Thioformamide. (In German.) E. Gagliardi and R. Pietsch. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 487-492.

Describes experimental procedure for the above, results showing that Ir cannot be quantitatively precipitated with sulfide, but that the separation of Ir from Pd is good if the amount of Ir does not exceed that of Pd.

8894 Effects of Maxima Suppressors on Polarographic Diffusion Currents. John Keenan Taylor and Roberta E. Smith. *Journal of Research of the National Bureau of Standards*, v. 48, Mar. 1952, p. 172-178.

Graphs and diagrams. 11 ref.

8895 Determination of Metallic Beryllium and Beryllium Carbide in Berlyllium Metal. Walter A. Bergholz. *Journal of Research of the National Bureau of Standards*, v. 48, Mar. 1952, p. 201-205.

Apparatus diagram and tables. 31 ref.

8896 Some Accurately Measured Infrared Wavelengths for Calibration of Grating Spectrometers. Earle K. Plyler, Norman M. Gailar, and Thomas A. Wiggins. *Journal of Research of the National Bureau of Standards*, v. 48, Mar. 1952, p. 221-227.

Uses absorption lines of the bands of CH_4 and H_2O vapor in the 1.1-2.3 micron spectral region. Tables and spectrograms. 10 ref.

8897 Direct Titration of Calcium in Blood Serum. A. H. Holtz and L. Seekles. *Nature*, v. 169, May 24, 1952, p. 870-871.

8898 Polarographic Determination of Fluoride. B. J. MacNulty, G. F. Reynolds, and E. A. Terry. *Nature*, v. 169, May 24, 1952, p. 888-889.

8899* Radioactive Methods of Analysis. G. D. Calkins. *Ohio Journal of Science*, v. 52, May 1952, p. 151-160.

Reviews properties of radioisotopes; isotopic tracing; analysis by isotopic dilution; radiometric analysis; analysis with neutrons; and limitations of radioactive methods.

8900 Electronically Controlled AC Interrupted Arc Source for Spectrographic Purposes. A. Bardocz. *Journal of the Optical Society of America*, v. 42, May 1952, p. 357-359.

Includes circuit diagram, table, and oscillograms.

8901* Assay of Uranium-Bearing Ores by Fission Analysis. W. W. Happ and J. L. Horwood. *Science*, v. 115, June 6, 1952, p. 622-623.

The possibility of assaying uranium ore by measuring the fissionable content with neutron-induced fissions was investigated by using a 50 mc. Ra-Be neutron source and standard α-scintillation detection equipment. In this way a direct indication of the U^{235} content of the ores was obtained.

8902* Method for Determining the Principal Constituents of Construction Plaster. (In French.) G. Pièce. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Feb. 1952, p. 62-64.

Gives details of methods for total water, moisture content, total $CaSO_4$, and $CaSO_4$ hemihydrate.

8903* Direct Determination of Oxygen in Coals. (In French.) **I. Method by Reduction on the Coal.** Marthe Bastick. **II. Method by Hydrogenation.** Henri Guérin and Paul Marcel. *Bulletin de la Société Chimique de France*, Mar.-Apr. 1952, p. 308-311.

The coal is oxidized in CO_2 on pieces of platinum-coated pyrex. In the hydrogenation method, Ni plus 2% Th is used as a catalyst, making it possible to make 20-30 analyses without any decrease in activity. Tabular data. 16 ref.

8904* A Technique for Studying Absorption in the Near Infrared; Absorption Spectra of Some Solvents for Plastic Materials. (In French.) M. Auméras, B. Laugrost, and R. Minangov. *Bulletin de la Société Chimique de France*, Mar.-Apr. 1952, p. 311-315.

Describes above technique which consists in transforming an optical image, projected on a photocathode, into an electronic image, visible on a fluorescent screen. Details of the apparatus are indicated; results are interpreted. Diagrams and micrographs. 24 ref.

8905* Limits of Electrochemical Investigation of Corrosion Processes and Oxygen Contents. (In German.) Fritz

15. *Analysis—Chemical and Physical*

Tödt. *Werkstoffe und Korrosion*, v. 3, May-June 1952, p. 205-209.

Tells how initial corrosion can be used for determination of the oxide-film and local cell-effect between oxide and basic metal by colorimetric measurement of dissolved iron salts. Such measurements have a practical importance for timely recognition of corrosion danger in iron evaporators. A second more accurate method is also described sensitive to as low as 0.001% O_2. This process has proved satisfactory for determining very small quantities of O_2 in feed water of high-pressure plants. Further applications promising success are measurement of O_2 in breweries, in biological systems for determining the metabolism of oxygen, in rivers for pollution control, and for simple and accurate recording of O_2 contents of gases. 11 ref.

8906* Determination of Iron Silicides, Silicon Carbide, and Silicon Dioxide in Mixtures. (In German.) R. Schwarz, J. Johann, and A. Zörner. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 3, 1952, p. 161-179.

Describes and diagrams new combustion-train process for the above, applicable to mixtures such as slags. Data are tabulated. 18 ref.

8907* Photometric Determination of Chromium in Tungsten Steels. (In German.) E. Asmus. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 3, 1952, p. 179-186.

Investigation of a number of filtrates shows that Pinsl's method for determining Cr can be applied to tungsten steels. Specifications for analyzing W steels with 0.2-20% Cr and 0-20% W with the Leifo photometer or the Leitz compensation photometer are presented. Tables and graphs.

8908* Determination of Traces of Sulfur in Organic Substances. (In German.) Friedrich Grassner. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 3, 1952, p. 186-191.

Rapid method for above is based on vaporization and combustion of the substance in an H_2-O_2 stream and determination of the resulting H_2SO_4 in a special turbidimeter. Diagrams and tables. 10 ref.

8909* Methodology of Chemical Vitamin A and D Determinations With Electrophilic Metal Halides. I. General and Methods Involving Antimony Pentachloride. (In German.) Johannes Brüggemann, Walther Krauss, and Jürgen Tiews. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 4, 1952, p. 241-250.

17 references.

8910* A Simple Method for Colorimetric Determination of Vitamin B_{12}. Part I. (In German.) H. C. Heinrich. *Fresenius Zeitschrift für analytische Chemie*, v. 135, no. 4, 1952, p. 251-258.

Includes absorption spectrum and calibration curve.

8911* The Iodometric Titration of Nickel With Thisulfate. (In German.) E. S. Tomula, Olavi Juutinen, and Pertti Tanskanen. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 4, 1952, p. 265-269.

Describes procedure for quantitative determination of Ni. Typical data are tabulated.

8912* Catalytic Studies in Analytical Chemistry. II. Iodometric Determination of Peroxysulfate Ions With the Aid of Mixed Catalysts. (In German.) Z. G. Szabó, L. Csányi, and Helene Galiba. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 4, 1952, p. 269-275.

8913* Studies on the Analytical Chemistry of the Pentavalent Phosphoric Acids. I. Alkalimetric Determination of Orthophosphoric Acid. (In German.) J. Fischer and G. Kraft. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 5, 1952, p. 321-332.

8914* Precipitation of Phosphate Ions With Magnesium in the Presence of Calcium and Other Metallic Ions, as Well as Its Quantitative Determination by Means of Ethylenediamine Tetra-Acetic Acid. (In German.) F. Huditz, H. Flaschka, and Ingrid Petzold. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 5, 1952, p. 333-340.

21 references.

8915* Photoelectric Colorimeter Method of Rapid Determination of Phosphoric Acid in All Solubility Forms and Concentrations in Fertilizers and Crude Phosphates. (In German.) G. H. Veltman. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 5, 1952, p. 340-349.

8916* Gravimetric and Volumetric Determination of Sulfur in Carbon Compounds. (In German.) D. Köszegi and I. Barcsay. *Fresenius' Zeitschrift für analytische Chemie*, v. 135, no. 5, 1952, p. 349-354.

Describes a simple method of determining organically combined sulfur which is recommended in place of the Carius process. Data are tabulated.

8917* Molybdenum-Vanadium Method for Determining Phosphate in Plant Ash. (In German.) F. Scheffer and H. Pajenkamp. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 56(101), nos. 1-3, 1952, p. 2-8.

Describes investigation of above new method and effect of SO_2 on the results. Comparison with well-known molybdenum-blue method proves new method to be superior. Specifications for routine analyses are presented. Data are graphed and tabulated.

8918* Colorimetric Determination of Humus in the Soil. (In German.) Hans Westerhoff. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 56(101), nos. 1-3, 1952, p. 49-53.

Describes a new method which makes it possible to analyze about 160 soil samples per day for their humus content. Data are tabulated.

8919* Warping of the Photographic Plate in the Plate Holder as a Source of Error in Quantitative Spectrographic Analysis. (In German.) Adolf Schöntag. *Zeitschrift für Wissenschaftliche Photographie, Photophysik und Photochemie*, v. 46, nos. 10-12, 1951, p. 182-187.

Amount of curvature is measured and causes investigated. Data are charted.

8920* Study of the Analytical Properties of Phenyl-Substituted, 1, 2-Dithol-3-Thionine, a New Organic Reagent for Copper, Mercury, Platinum, and Palladium. (In Russian.) M. G. Voronkov and F. P. Tsiper. *Zhurnal Analiticheskoi Khimi*, Nov.-Dec. 1951, p. 331-336.

8921* Amperometric Titration of Organic Developing Agents Using a Rotating Platinum Microelectrode. (In Russian.) S. G. Bogdanov and N. S. Sukhobokova. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 344-347.

Discusses the above. Tables and graphs.

8922* Some Methods for Quantitative Determination of Simple Vinyl Esters. (In Russian.) M. F. Shostakovskii, E. N. Prilezhaeva, and N. I. Uvarova. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 348-352.

Three methods were evaluated: hydrolytic oxine formation in presence of hydroxylamine chloride or hydroxylamine sulfate, and an iodometric method. Gives details and typical data in tables.

8923* Photometric Determination of Acetaldehyde in the Presence of Ethylene Oxide. (In Russian.) A. I. Naumov. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 353-356.

Details of procedure. Typical data are tabulated and graphed.

8924* Quantitative Determination of Tungsten and Columbium in Complex Alloys. (In Russian.) R. B. Golubtsova. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 357-363.

Describes polarographic and colorimetric methods of analysis for W and Cb in highly alloyed Co, Ni, and Fe alloys, in the presence up to 5% Mo, 3% Ti, and 1.5% V. The methods may also be applied to Cr-base alloys. Typical data are tabulated.

8925* New Colorimetric Method for Determining Molybdenum. (In Russian.) M. Ia. Shapiro. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 371-374.

Use of an aromatic aldehyde for determination of Mo in steels is described. Experimental data are tabulated. 13 ref.

8926* Determination of Small Amounts of Nickel in Lead in Working Parts of Lead Batteries. (In Russian.) A. S.

Andreev, O. P. Azrel'ian, and E. S. Pospelova. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 375-382.

Describes development of colorimetric procedure. Typical data are tabulated.

8927* Apparatus for the Reduction of Titanium and Iron by Zinc Amalgam During Their Volumetric Determination. (In Russian.) M. I. Kriventsov. *Zhurnal Analiticheskoi Khimii*, Nov.-Dec. 1951, p. 384-386.

Describes and diagrams above apparatus; typical data are tabulated.

8928* Colorimetric Determination of Small Amounts of Dihydroxy Phenols. (In Russian.) D. N. Vaskevich and Ts. A. Gol'dina. *Zhurnal Prikladnoi Khimii*, v. 24, Nov. 1951, p. 1214-1216.

Describes procedure. Typical data are tabulated.

Books

8929 Valovoi Khimicheskii Analiz Pochv i Gruntov. (Complete Chemical Analysis of Ground and Soils.) E. V. Arinushkina. 176 pages. 1949. Moscow University, Moscow, USSR. (S593 Ar43v)

Basic methods for investigating the chemical properties of soils and grounds, giving special conditions for each determination in detail. Intended as a manual for university students studying soil agronomy and agriculture and as a handbook on chemical analysis of soils.

See also:

8367 (radioactivity measurements on minerals)
8433 (analysis of Mg-alloy castings)
9032 (determination of cyanides and metallic ions)
9193 (infrared spectrocopy of lubricants)
9316 (chromatography of organic acids)
9317 (electrochromatography apparatus)
9369 (reduction at the dropping-mercury electrode)
9402 (oscillography of diffusion systems)
9430 (analysis for linoleate in natural oils)
9434 (semimicro hydrogenation apparatus)
9440 (analysis of organoselenium compounds)

16. APPARATUS, METHODS, AND STANDARDS

8930* A Stroboscopic Effect in the X-Ray Analysis of Crystalline Aggregates. (In English.) H. J. Goldschmidt. *Acta Crystallographica*, v. 5, Mar. 1952, p. 256-259.

An X-ray diffraction technique is described, based on observation of a stroboscopic effect which results from synchronism between the speed of specimen rotation and pulse frequency of the incident X-ray beam. The effect consists in regular striation occurring at inclinations varying among diffraction spots; these striations can be caused to disappear by heat treatment. Structural details of a crystalline mass are revealed, which would otherwise not be apparent. A photograph showing striations gives simultaneously orientation and lattice spacing of a given crystallite, and allows differentiation between different crystal sizes. One potential application is to distinguish between strain and small particle size as causes of line broadening. Application to metals and nonmetals is illustrated.

8931 Size Distribution of Spheres by Light Scattering. F. Bueche. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2373.

Another method for determining the range of sizes of spherical particles in solution believed to have some practical advantages.

8932* An Investigation of Electromagnetic Flowmeters. H. G. Elrod, Jr., and R. R. Fouse. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 589-594; disc., p. 594.

Use of the above for measurement of the flow of molten corrosive metals in small sizes of conduit appears to possess the greatest number of advantages. The work described was undertaken to acquire further knowledge of the characteristics of these instruments and some experience in their operation.

8933* Analysis of Some Hydraulic Components Used in Regulators and Servomechanisms. S. Z. Dushkes and S. L. Cahn. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 595-601.

Discusses theory of operation, and static and dynamic characteristics of some hydraulic components used in regulator applications. Diagrams and graphs.

8934* The Tucumcari Tank Failure. *Journal, American Water Works Association*, v. 44, May 1952, p. 435-440; disc., p. 441.

Report of New Mexico Society of Professional Engineers on disaster of Dec. 13, 1951. A poorly welded vertical butt joint between ⅝-in. shell plates is believed to have been responsible for the failure. Details are given. Failure to follow AWWA specifications was also a contributory factor.

8935* The Measurement of Diffusion Current With a Pen-Recording Polarograph. W. Furness. *Analyst*, v. 77, May 1952, p. 246-256.

A study of some factors involved in using a Tinsley polarograph with special reference to results obtained when operating without capacitance damping. Tables, polarogram, and circuit diagram. 14 ref.

8936 Automatic Determination of Radioactivity on Filter Paper Chromatograms. Louis B. Rockland, José Lieberman, and Max S. Dunn. *Analytical Chemistry*, v. 24, May 1952, p. 778-782.

An automatic sample changer for rapid survey and accurate counting of filter-paper chromatograms with aid of two types of recording counters; other standard apparatus for determination of radioactivity. Diagrams, graphs, and tables. 11 ref.

8937 Rapid Sedimentation Analysis With the Kelly Tube. V. V. Deshpande and M. S. Telang. *Analytical Chemistry*, v. 24, May 1952, p. 885-887.

Discusses above procedure and its merits and disadvantages. Describes modified procedure giving good results in short times.

8938* Mechanical Testing of Solid Materials. Walter Ramberg. *Applied Mechanics Reviews*, v. 5, June 1952, p. 241-288.

A review. 117 ref.

8939* Temperature Error and Its Compensation by Means of a Crossed-Coil Device. (In German.) Walter Hunsinger and Irmgard von Schaewen. *Archiv für technisches Messen*, Apr. 1952, p. 89-90.

Diagrams illustrate brief discussion on a method of compensating temperature error of above device.

8940 Radioisotopes Add a New Dimension. Ralph Belcher. *Battelle Technical Review*, v. 1, May 1952, p. 52-53.

Miscellaneous applications as tracers, uses of radioactive fission products, radiography, and other production-control procedures.

8941* The AMA Reader. F. C. Kuch. *Bell Laboratories Record*, v. 30, June 1952, p. 237-243.

Describes above device, used in conjunction with computing, sorting, and similar machines to transform the information perforated on the input paper tapes into equivalent electrical information that may be properly processed. Photographs and diagrams.

8942 New Techniques for Measuring Forces and Wear in Telephone Switching Apparatus. Warren P. Mason and Samuel D. White. *Bell System Technical Journal*, v. 31, May 1952, p. 469-503.

Describes several new techniques devised for measuring normal and tangential forces and for producing and controlling normal and tangential motions for wear studies. The forces are measured by inserting small barium titanate ceramics between points of application of the forces and observing the voltages generated on a cathode-ray oscillograph. With these ceramics, forces were measured for relays and for frictional sliding of a wire over a plastic. Quantitative measurements of wear were made for a variety of materials, and it was shown that materials with a large elastic strain limit wear better than materials with a small elastic strain limit even though the latter have a higher yield stress; materials such as plastics and rubber will outwear materials such as metals or glasses. Brass and stainless steel

16. *Apparatus, Methods, and Standards*

were the metals studied. Graphs, diagrams, tables, and illustrations. 16 ref.

8943 A Novel High Vacuum Furnace. E. J. Caule. *Canadian Journal of Technology*, v. 30, Apr. 1952, p. 63-65.

Describes above suitable for high-temperature studies of small specimens of metal and other applications. Apparatus diagram.

8944 The Pressure Coefficient of Resistance of Thermistors. A. D. Misener and L. G. D. Thompson. *Canadian Journal of Technology*, v. 30, Apr. 1952, p. 89-94.

Above determined for one type of thermistor, up to pressures of 2000 psi. at temperatures of 0, 25, and 50°C. Apparatus diagram and graphs.

8945 A Transient Heat Flow Method of Determining Thermal Conductivity: Application to Insulating Materials. C. P. Lentz. *Canadian Journal of Technology*, v. 30, June 1952, p. 153-166.

Some of the characteristics of above method for measuring thermal conductivity of insulating materials were investigated. Typical results (charted and tabulated) show advantages and disadvantages of the procedure, as well as some modifications.

8946 Process Instrumentation. Theodore R. Olive and Cecil H. Chilton, editors. *Chemical Engineering*, v. 59, May 1952, p. 161-208.

Special report includes the following papers: "New Tools For the Process Engineer", Douglas M. Considine; "Guide to Process Instrument Elements"; "New Tools For the Instrument Engineer", R. E. Clarridge and W. J. Berk; "Process Control By End-Point Analysis", W. A. Patterson and J. M. Devine; "Instrumentation Pays Its Own Way", F. H. Trapnell, J. Johnston, Jr., and W. A. Crawford; "A Critical Look at Graphic Panels", Wesley T. Dorsheimer; "Instruments: Equipment, Not Accessories", Edmund D. Haigler; "Push-Button Plants: When and How?", George A. Hall, Jr.; and a glossary of special terms. 16-page folded chart of instrument elements is found inside the front cover.

8947* High-Intensity Measuring Processes for Sedimentation, Electrophoresis, and Diffusion Experiments; An Instrument for Measuring Diffusion Constants. (In German.) H. J. Antweiler. *Chemie-Ingenieur-Technik*, v. 24, May 1952, p. 284-288.

21 references.

6948 Liquid-Weighing Scale Controls Rate of Flow. Svend R. Pedersen. *Electronics*, v. 25, June 1952, p. 104-106.

Wide range of flow rates with accompanying high degree of accuracy is advantage of system using weight of liquid rather than volume as control factor. Synchro system reacts to scale unbalance to throttle the valve, thus determining rate of flow.

8949 Wind Recorder For Microclimatology. George West. *Electronics*, v. 25, June 1952, p. 136-138.

Velocity and direction of very light winds make inked traces on battery-operated, spring-driven, paper-tape recorders. Employs novel low-inertia speed transducer and keep-alive circuit useful in other recorders to speed pen response.

8950 Strain-Gage Balance Measures Drag Force. *Electronics*, v. 25, June 1952, p. 156.

Precise measurement of drag force acting on supersonic wind-tunnel models at Naval Ordnance Laboratory using electronic strain-gage balance shown in block-diagram form.

8951* Quality Control of Lead-Bronze Bearings. E. Uhlir. *Engineers' Digest*, v. 13, Apr. 1952, p. 117, 120. (Translated and condensed from *Maschinenbau und Wärmewirtschaft*, v. 7, Jan. 1952, p. 4-8.)

Describes procedure for detecting defects in the lining of the above, which can be integrated easily in the production process. Instead of the usual hardness testing and X-ray examination, a visual procedure was developed. Cutting speed during machining is merely reduced and tool angle set at 80°. The resulting surface shows all defects, even nonuniform Pb distribution. Discusses casting problems.

8952 Study of a Transient Heat Method for Measuring Thermal Conductivity. D. d'Eustachio and R. E. Schreiner. *Heating, Piping, & Air Conditioning*, v. 24, June 1952, p. 113-117.

Describes an electrically heated probe 4 in. long and 0.030 in. in diam. constructed and used for measuring thermal conductivity of insulating materials, such as cellular glass.

8953 Thermocouple Thermal Error. Jack W. Rizika and Warren M. Rohsenow. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1168-1171.

An analysis which provides a means of estimating the thermal error in order to obtain a closer evaluation of fluid temperature.

8954 Valve Control of Liquid Flow. Russell Milham and Allan R. Catheron. *Instruments*, v. 25, May 1952, p. 596-598, 634-638, 640, 642.

Appraises the flow-lift characteristics of various control valves under different system pressure conditions, and relates these characteristics to quality of control.

8955 Indirect Process Control by Servomechanism. Robert G. Durnal. *Instruments*, v. 25, May 1952, p. 606-607.

Description clarified by circuit diagrams.

8956 Resume of Thermocouple Checking Procedures. Henry C. Quigley. *Instruments*, v. 25, May 1952, p. 616-622; *I. S. A. Journal*, v. 8, May 1952, p. 51-57.

The procedures given are of 2 general classifications: calibration by comparison with calibrated standards and calibration at fixed points. Under the former classification are presented the methods of comparison in place, in tube and muffle furnaces, and in baths. Under the latter, procedures utilizing freezing points, melting points, and boiling points are described.

8957* The Assessment of Specific Surface By Single-Observation Photo-Extinction Methods. H. E. Rose. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 217-220.

Empirical expressions are derived whereby a value of specific surface in close agreement with that obtained from a size-frequency analysis may be obtained from a single measurement of the opacity of a suspension of the powder.

8958 Purification of Hydrocarbons For Use As Solvents in Far-Ultraviolet Spectroscopy. W. J. Potts, Jr. *Journal of Chemical Physics*, v. 20, May 1952, p. 809-810.

Ultraviolet transmission of n-heptane, isopentane, 3-methylpentane, and methylcyclohexane are shown at various stages of purification. The particular advantages of each as a solvent in far-ultraviolet spectroscopy is discussed.

8959 Surface Areas of Metals and Metal Compounds: A Rapid Method of Determination. C. Orr, Jr., H. G. Blocker, and Susan L. Craig. *Journal of Metals*, v. 4, June, 1952; *Transactions of American Institute of Mining and Metallurgical Engineers*, v. 194, p. 657-660.

Shows that fatty-acid adsorption can be used to determine the surface area of a variety of powdered metals and metal compounds, offers further confirmation of the correctness of gas-adsorption methods, and presents a simplified technique for determination of surface area which is suitable for routine work. 22 ref.

8960* A Method of Correcting the Cosine Error of Selenium Rectifier Photocells. G. Pleijel and J. Longmore. *Journal of Scientific Instruments*, v. 29, May 1952, p. 137-138.

Simple and effective method applied successfully to measurement of daylight illumination in model rooms.

8961* A Visual and a Photoelectric Portable Colour Temperature Meter. H. G. W. Harding. *Journal of Scientific Instruments*, v. 29, May 1952, p. 145-148.

Range of the visual meter is from 2000°K. to infinite temperature and that of the photoelectric one 1800-10,000°K. Accuracy of both instruments is estimated to be about 100 at 3000 and 1000 at 10,000°K.

8962* A Direct Method for Measuring the High Voltage Stability of the Electron Microscope. T. Mulvey. *Journal of Scientific Instruments*, v. 29, May 1952, p. 149-150.

8963* Furnace Construction and Thermocouple Arrangements for a High Temperature X-Ray Camera. Z. S. Basinski, W. B. Pearson, and J. W. Christian. *Journal of Scientific Instruments*, v. 29, May 1952, p. 154-155.

Modifications enable the actual specimen temperature to be measured accurately in the range 700-1000°C. Temperatures are measured and controlled by means of two rigidly fixed ring thermocouples of new design.

8964* A Single-Channel Pulse-Height Discriminator of High Speed and Stability. G. T. Wright. *Journal of Scientific Instruments*, v. 29, May 1952, p. 157-160.

Discrimination between voltage pulses of different magnitudes is effected by simultaneously applying each pulse and its differential to the X and Y deflecting plates respectively of an oscilloscope and by scanning the screen in the X direction with a thin optical slit and a photomultiplier. Pulse-height distribution is displayed on a second oscilloscope and recorded photographically. Maximum counting rate for regularly occurring pulses is 3×10^5 per sec.

8965* The Measurement of Temperature Within Tubes at High Pressures and Low Temperatures. A. G. Monroe and D. J. Penny. *Journal of Scientific Instruments*, v. 29, May 1952, p. 163.

Simple device described and diagrammed has given very satisfactory service in an investigation covering temperatures between −195 and 50°C. at pressures up to 2000 psi. The device has been used for mounting thermocouples within tubes of ⅝, ¼, and ⅛ in. bore. It has withstood repeated changes of temperature and pressure, within above limits, without failure or leakage.

8966* Monitoring Device for Use With an X-ray Diffraction Cylindrical Camera. M. S. Ahmed. *Journal of Scientific Instruments*, v. 29, May 1952, p. 163-164.

A modified form of Goppel's camera, simpler to construct, and more suitable for use with a cylindrical film.

8967* A Greaseless Mercury-Sealed Vacuum-Tap. H. M. Stanier and J. H. Beynon. *Journal of Scientific Instruments*, v. 29, May 1952, p. 165-166.

Glass tap, lubricated with colloidal graphite, is designed so that only mercury and glass surfaces come into contact with the vapors in the vacuum system. Diagram.

8968* A Simple Resistance Thermometer. H. S. Eisner. *Journal of Scientific Instruments*, v. 29, May 1952, p. 166.

Pt resistance thermometer of very low thermal capacity, small dimensions and comparatively high resistance, suitable for ambient gas-temperature measurements. Diagram.

8969* The Extension of the Magnification Range of a Two-Stage Electron Microscope. C. E. Challice. *Journal of Scientific Instruments*, v. 29, May 1952, p. 167.

By using a twin-gap projector pole-piece, distortion has been found to be tolerable between approximate limits of 2500 and 25,000 magnification. Diagram and graphs.

8970 Automatic-Control Terminology. *Mechanical Engineering*, v. 74, June 1952, p. 486-489. (Condensed from American Society of Mechanical Engineers, Paper 52-SA-29, by Marc A. Princi.)

Indicates scope of the current revision of above, submitted for comment to the membership of ASME.

8971* Principles of the Magneto-Inductive Measurement of Non-Ferromagnetic Layers on Iron Bases, Especially With Varying Radiation of Curvature. (In German.) Paul Koch. *Metalloberfläche*, sec. A, v. 6, May 1952, p. A67-A70.

Shows that accuracy of measuring layer thicknesses by above method requires consideration of curvature by adjusting the zero point of the measuring instrument to curvature of the uncoated part. Diagrams, tables, and graphs.

8972* The Matrix Micro-Maag as an Internal Gauging Standard. Max Maag. *Microtechnic* (English Ed.), v. 6, no. 1, 1952, p. 26-29. (Translated from the German.)

Describes, diagrams, and illustrates above internal micrometer—a 3-point-contact instrument for rapid and reliable internal measurements with an accuracy of 1μ.

8973* Simple Emanation Method for Producing Highly Pure Solutions of Radioactive Lead and Bismuth. (In German.) E. Broda, H. Fabitschowitz, and T. Schönfeld. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 482-486.

Method described utilizes an air stream containing radioactive Th (also known as thoron) to produce very dilute but pure Pb and Bi solutions.

8974 Properties of Certain Statistics Involving the Closest Pair in a Sample of Three Observations. Julius Leiblein. *Journal of Research of the National Bureau of Standards*, v. 48, Mar. 1952, p. 255-268.

Presents a mathematical investigation leading to precise determination of some of the biases that result from above type of selection. The findings imply that selected pairs not only tend to overestimate considerably the precision of the experimental procedure, but also result in less accurate determinations. Tables. 11 ref.

8975* A Procedure For Reproducing Radiographs. D. T. O'Connor and L. V. Burt. *Non-Destructive Testing*, v. 10, Apr. 1952, p. 9-11.

Procedure described depends upon the contrast variations obtainable with commonly available films and developers. All the operations described can be conveniently carried on in a standard X-ray dark room.

8976* Selection of X-Ray Detectors For Automatic Inspection. J. E. Jacobs and A. L. Pace. *Non-Destructive Testing*, v. 10, Apr. 1952, p. 12-17.

Describes and discusses various methods for the above, their advantages, disadvantages, and applications. 14 ref.

8977* Multi-Directional Magnetic Particle Inspection. R. A. Peterson. *Non-Destructive Testing*, v. 10, Apr. 1952, p. 18-22.

Describes principles and practical application of above procedure, developed to locate simultaneously defects in any plane. Equipment and typical results are illustrated.

8978* Curved Crystal Developments In Ultrasonic Resonance Testing. C. R. Betz. *Non-Destructive Testing*, v. 10, Apr. 1952, p. 28-31.

Even in cases where flat crystals give useable indications, greatly improved results are obtained by use of a crystal ground to fit the work. In particular, use of a curved crystal and suitable fixtures often makes rapid production inspection possible.

8979* Radioactivation Determination of Zirconium in Zr-Hf Mixtures. J. E. Hudgens, Jr., and H. J. Dabagian. *Nucleonics*, v. 10, May 1952, p. 25-27.

Zr concentration, in mixtures ranging from nearly pure Zr to as little as a few tenths ppm., can be determined within about 1% by combining slow-neutron activation and radiochemical separation as described. 22 ref.

8980* Backscattering of Beta Rays in Windowless G-M Counters. Darleane Christian, Wayne W. Dunning, and Don S. Martin, Jr. *Nucleonics*, v. 10, May 1952, p. 41-43.

Absolute disintegration rates can be determined in a windowless counter only if the backscattering factor is known. This factor has been found experimentally by using various backscatterers that are thick enough to give a limiting maximum value.

8981* How To Reduce Fishing Jobs, Extend Life of Drill Strings. R. S. Martin. *Oil and Gas Journal*, v. 51, June 2, 1952, p. 97-101.

Describes systematic inspection system for drill pipe which has reduced fishing jobs 90%, while at the same time extending the life of the drill string as much as 100%.

8982* The Use of a Pulse-Height-Analyzer for Time Intreval Measurements. (In English.) G. Jenssen and A. Sunde. *Physica*, v. 18, Apr. 1952, p. 265-269.

Describes a method of conversion for above use. Circuit diagrams.

8983 The Texture of Diamonds Used For Counting α, β or γ Particles As Found From Divergent-Beam X-Ray Pho-

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tographs. H. J. Grenville-Wells. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 313-320.

Since radiation-counting efficiency of diamonds is a structure-sensitive property, x-ray experiments were undertaken to see whether it is related to crystal texture. A technique for obtaining divergent-beam photographs superimposed on Laue photographs was developed, and results are given for colorless octahedral diamonds whose ultraviolet transparency, β-particle counting efficiency, and fluorescence are known.

8984 Liquid Sensing Device With No Moving Parts. Dell Phillips. *Product Engineering*, v. 23, June 1952, p. 134-135.

Textual description and diagrams. Uses optical and electrical principles. Applications.

8985* Significance of Wheatstone Bridges for the Measuring Process With Electrical Strain Gages Which Can Be Cemented Onto the Test Specimens. (In German.) A. U. Huggenberger. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Apr. 1952, p. 105-116.

Describes the above for varying arrangements on the test specimens. Examples of application are indicated; data are extensively tabulated. 11 ref.

8986* Present Status of X- and γ-Ray Testing of Materials. (In German.) Rudolf Berthold, Otto Vaupel, and Norbert von Wetterneck. *Stahl und Eisen*, v. 72, Apr. 24, 1952, p. 492-499; disc., p. 499-500.

Progress made in exposing films with portable X-ray equipment for 300 kv. with continuous constant current voltage. Improving the quality of pictures by fine-grained X-ray films and lead amplifier foils. γ-ray radiators available. Diagram of exposure with possibility of detecting faults when exposing films with Co-60 and Ir-192 and comparison with X-ray pictures. Economic efficiency of film exposures with γ-ray radiators. Protection against radiation when using γ-ray radiators. Tables, graphs, and illustrations.

8987 Nuclear Gaging Controls Abrasive Coating Thickness. *Steel*, v. 130, June 9, 1952, p. 96-98.

Integration of continuous beta-ray gaging with production control on an automatic basis permits thickness and density of adhesive and abrasive to vary no more than 1%. New production technique installed at Carborundum Co.'s Coated Products Div., Niagara Falls, N. Y. Diagram and illustrations.

8988 Ultrasonics. Inspection Applications Grow. Ralph H. Frank. *Steel*, v. 130, June 16, 1952, p. 99-102.

Brief general discussion together with description of some examples of above, illustrated with diagrams.

8989 Statistical Methods in the Design of Experiments. Edwin R. Bowerman, Jr. *Sylvania Technologist*, v. 5, Apr. 1952, p. 41-44.

Some examples are given which illustrates the method as applied to a simple case.

8990* Moisture Determination in Paper By Oven Drying. G. Broughton and A. K. Hobbs. *Tappi*, v. 35, May 1952, p. 217-219.

Methods are reviewed. Sources of error are discussed critically. Results on cage and weighing-bottle methods in free-convection air ovens are presented for a number of papers.

8991* Instrumentation Studies. LXX. A Study of Instruments For the Measurement of Opacity of Paper. III. The Weston Opacity Meter and the Welch Densichron. L. R. Dearth, O. H. Olson, and J. A. Van Den Akker. *Tappi*, v. 35, May 1952, p. 185A-190A.

8992 Servomechanism Techniques Applied to Manufacturing Problems. Part 2. (Concluded.) S. P. Higgens, Jr., and G. W. McKnight. *Tele-Tech*, v. 11, June 1952, p. 62-63, 139, 141, 143-144.

Gives 4 examples of flow-control systems which indicate that the servo-analysis methods described in Part 1 can be applied to process-control problems to obtain performance predictions. Graphs.

8893* Fixed Gage Standards and Practice. Part I. William H. Gourlie. *Tool Engineer*, v. 28, June 1952, p. 40-42, 71-72.

Includes tables of tolerances. (To be continued.)

8994* Structural Neutronography. (In Russian.) R. P. Ozerov. *Uspekhi Fizicheskikh Nauk*, v. 45, Dec. 1951, p. 481-552.

A review of the use of neutrons instead of X-rays or electron beams for the study of the structure of matter. 76 ref.

8995* Registration and Interpretation. Processes and Devices for Evaluation of Results of Statistical Measurements. F. Ferrari. (In German.) *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Apr. 1, 1952, p. 274-279.

Describes the varied ways in which the tabulation recorded on perforated tape can be used for machine operation. Different types of machinery for this purpose are described, and their mode of operation indicated. Diagrams and photographs.

8996* Possibilities of Use of Continuous Testing Machines With Oscillating Drives. (In German.) Max Russenberger. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Apr. 21, 1952, p. 314-318.

Describes a new type testing machine for investigating tensile stress, pressure, bending, and torsion stresses; it can also be used for determining damping, and for measurement of elasticity moduli. Examples illustrate its varied applications. Tables, graphs, diagrams, and photographs.

8997* Gas-Flow Driers. (In German.) K. Kröll. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, May 1, 1952, p. 360-364.

Presents theoretical evaluation of above. Application of such driers is indicated; possibilities for adapting them to specialized tasks are outlined. Diagrams and graphs. 11 ref.

8998* Electronic Control and Regulation Demonstrated on Examples From the Paper and Textile Industry. (In German.) Ott-Heinrich Blaum. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, May 21, 1952, p. 441-448.

Designs, functions, and operations of a number of electronic controls are described. Graphs, diagrams, and photographs. 16 ref.

8999* An Interference Process for Investigating Rough Surfaces. (In German.) Ernst Zehnder. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, May 21, 1952, p. 456-458.

Shows that roughnesses below one micron can be measured by supplementing the interference microscope by the imprint film-immersion process. Diagrams and interference pictures.

9000* An Indirect Regulator for Electric Furnaces. (In German.) Franz Eberhard Wittig. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 161-162.

Describes and diagrams device mentioned in preceding article. Its limit of error is 1%. The regulator can also be used with the SiC tube furnace.

9001* Theoretical and Experimental Basis of the Nondestructive Testing of Materials by Means of the Eddy-Current Process. (In German.) **I. The Contact Coil Process.** Fritz Förster. **II. Practical Results and Industrial Applications of the Contact Coil Process.** Fritz Förster and Helmut Breitfeld. *Zeitschrift für Metallkunde*, v. 43, May 1952, p. 163-180.

Describes above process and a device developed on the principle of the contact coil. Detailed data are given on extent of the measurements, their accuracy, and sensitivity of the device, possibilities of application of the process, and experiences with it in industry. Charts, tables, diagrams, micrographs, and photographs. 16 ref.

9002* Determination of the True Heat Capacity of Powdered Materials at High Temperatures. (In Russian.) M. M. Popov and G. L. Gal'chenko. *Zhurnal Obshchei Khimii*, v. 21(83), Dec. 1951, p. 2220-2235.

A method involving direct heating with continuous input of a measured amount of heat was used to determine the true heat capacities of nonmetallic powders at temperatures from 100 to 700°C. in an adiabatic calorimeter. Equipment is diagrammed. Data are tabulated and charted.

Miscellaneous Publications

9003 Voids and Wax In Solid High-Voltage Cables. Frank J. Pohnan. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1372-1375; disc., p. 1375-1376. (TK1 Am35tr)

New method of inspection of impregnation of solid-type cable insulation. Based on the fluorescence of oils and waxes when activated by ultraviolet light. Illustrated.

9004 Stability of Varying-Element Servomechanisms With Polynomial Coefficients. M. J. Kirby and R. M. Giulianelli. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1447-1450; disc., p. 1451. (TK1 Am35tr)

9005 Servomechanism Transient Performance From Decibel-Log Frequency Plots. H. Harris, Jr., M. J. Kirby, and E. F. Von Arx. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1452-1459; disc., p. 1459. (TK1 Am35tr)

The method described can be used to find the approximate response of any linear servosystem to almost any input; the resulting formulas emphasize those elements of the frequency response which contribute most to the transient, and suppress complicating nonessentials.

9006 The Scotch Plaid Raster. J. Kates and V. G. Smith. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1480-1484. (TK1 Am35tr)

The memory of a number of electronic computers is based on the storage of discrete charges on the inner face of a cathode-ray tube. Effect of variations in the resistor network determining the location of these charges was investigated. It is shown that substantial advantages can be derived from a raster with non-uniform spacing, such a raster having somewhat the appearance of the stripes of a Scotch Plaid.

9007 Method For the Determination of Hysteresis Loop Area. W. B. Conover. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1485-1486. (TK1 Am35tr)

Method described is somewhat less accurate than conventional methods, but more rapid and convenient, and requires no special equipment. It can be applied directly to loops on the screen of a cathode-ray oscilloscope without photography or manual tracing. Illustrated by a typical hysteresis loop for magnetic sheet steel.

9008 Sampled-Data Control Systems Studied Through Comparison of Sampling With Amplitude Modulation. William K. Linvill. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1779-1786; disc., p. 1787-1788. (TK1 Am35tr)

Oescribes above as applied to servo systems. Diagrams.

9009 Electrical Techniques for Compensation of Thermal Time Lag of Thermocouples and Resistance Thermometer Elements. Charles E. Shepard and Isidore Warshawsky. National Advisory Committee for Aeronautics, Technical Note 2703, May 6, 1952, 85 pages. (TL570 Un3t).

Basic electrical networks are described for the above for use in combustion research and in control of jet power plants. Measurement or detection of rapid temperature changes by use of such elements. Diagrams, graphs, and illustrations. 10 ref.

9010 Analogue-Computer Simulation of an Autopilot Servo System Having Nonlinear Response Characteristics. Arthur L. Jones and John S. White. National Advisory Committee for Aeronautics, Technical Note 2707, June 1952, 30 pages. (TL570 Un3t).

Books

9011 Mikrogeometriia Obrabotannoi Metallicheskoi Poverkhnosti i Ee Izmereniia. (Microgeometry of Machined Metallic Surface and Its Measurement.) V. A. Barun, 180 pages. 1948. Government Scientific-Technical Publishing House for Machine-Industry Literature, Moscow and Leningrad, U.S.S.R. (TN690 B28mi)

Discusses the present status of the problem of measurement of surface finish of machined metallic surfaces and methods and devices for this purpose. Basic concepts are explained. Apparatus are described. The problem of standardization of surface quality is discussed. 24 ref.

9012 Regulirovanie Mashin. (Regulation of Equipment.) Z. Sh. Blokh. 360 pages. 1950. Government Publishing House for Technical-Theoretical Literature, Moscow and Leningrad, U.S.S.R.

Comprehensive treatise on direct and indirect control devices for all kinds of industrial equipment. Includes numerous diagrams, graphs, and detailed mathematical explanations of principles of operation.

9013 Industrial Process Control By Statistical Methods. John D. Heide. 297 pages. 1952. McGraw-Hill, New York. (HA40.I6 H36i)

Practical manual for use of statistics to control the quality of industrial products during the manufacturing process. Covers statistical methods required and practical and technical problems of applying them to factory processes. Mathematics are kept as simple as possible.

9014 The Measurement of Radio Isotopes. Denis Taylor. 118 pages. 1951. John Wiley & Sons, New York. (TK9145 T21m)

Written for the non-specialist. After summarizing some of the main phenomena and techniques of radioactivity, the more important experimental methods used for detection and assay of radioactive materials are outlined. Emphasis is on physical principles involved. Explains advantages and limitations of methods and instruments described. Diagrams and footnote references.

9015 Deistvuiushchie Tekhnicheskie Uslovia na Produktsiiu Tsvestnoi Metallurgii. (Technical Operating Conditions in Nonferrous Metallurgical Production.) Ed. 2. 490 pages. 1949. State Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Moscow, U.S.S.R. (N758 D36)

Handbook of Soviet standards, specifications, and approved procedures for testing and inspection. Includes tables of compositions of standard alloys used in the U.S.S.R.

See also:
8452 (testing and inspection of steel castings)
8501 (X-ray standards for Al arc welds)
8528 (interpretation of weld radiographs)
8543 (inspections of welded heat exchangers)
8715 (hardness-determination methods)
8736 (high-temperature stress-relaxation testing)
8740 (hardness tester for small loads)
9170 (high-speed photography of cracking process)

17. METALS—FABRICATION AND USES

9016* Utilization of Manganese in Special Steels. (In English.) *Aciers fins et Speciaux Français*, Mar. 1952, p. 33-38.

Describes French practice in the above, giving details of compositions for different purposes, also properties in a general way.

9017* Modern Railway Track "French Style" and the Use of Special Steels. (In English.) *Aciers fins et Speciaux Français*, Mar. 1952, p. 80-82.

Discusses extent to which plain-carbon steel and various low-alloy steels meet requirements of the above. Recommends use of a Cr-Mn steel for tie plates and clamps. Mechanical properties are indicated.

9018 Rare Earths Are Moving Into Industry. *Business Week*, May 31, 1952, p. 46, 50-51.

Outlines improved properties obtained in numerous cases upon addition of rare earths to standard alloy and stainless steels.

9019 Aluminum Alloys in Civil Engineering Practice. Part 1. Introduction. S. K. Ghaswala. *Light Metal Age*, v. 10, Apr. 1952, p. 18-20, 22, 25.

Part 1 includes a brief history of the above and a description of general and architectural properties and uses. (To be continued.)

9020 Pre-Plated Drawn Steel Wire Saves Scarce Metals. Herbert Kenmore. *Materials & Methods*, v. 35, May 1952, p. 96-98.

Steel wire plated with either Cu, brass, or Ni and then drawn to size is finding many uses in both industrial and consumer

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fields because of its ability to be formed without flaking of the coating. Outlines process; describes and illustrates typical applications.

9021 How To Choose Spring Materials. (Concluded.) M. Gerard Fangemann. *Materials & Methods*, v. 35, May 1952, p. 112-116.

Explains how the cost and performance of a spring depend on the material used and how each material meets particular stress, accuracy, corrosion-resistance, and shock-resistance requirements. Table gives mechanical and physical properties, heat treatment, and uses of 12 common ferrous and nonferrous spring materials.

9022* Aluminum vs. Copper. F. L. Church. *Modern Metals*, v. 8, May 1952, p. 25-28, 30-32.

Discusses shift from Cu to Al in electrical industry. Details causes and discusses some of the principal products in which Al is gaining.

9023* Titanium and the Air Force. J. N. Dick and James R. Coxey. *Modern Metals*, v. 8, May 1952, p. 35-36, 38-39.

Outlook for Ti, particularly in respect to certain fabrication difficulties, is discussed from the Air Force point of view. Both of the authors are associated with the Directorate of Industrial Resources, Office of Deputy Chief of Staff, Materiel Headquarters, U. S. Air Force, Washington.

9024 Guide For Selecting Tool Steels and Carbides. *Steel*, v. 130, June 16, 1952, p. S1-S32.

A directory listing more than 50 companies and their products. Includes index of materials by trade name and index of materials by companies. Latter gives primary application, type, analysis, quenching medium, machinability annealed, and movement in hardening.

9025* Stability of Lead and Lead-Alloy Anodes During Electrolysis of Sulfate Solutions. (In Russian.) G. Z. Kir'iakov and V. V. Stender. *Zhurnal Prikladnoi Khimii*, v. 24, Dec. 1951, p. 1263-1273.

A large number of Pb alloys were evaluated as anodes for use in above application. An alloy containing 98.68% Pb, 1.0% Ag, 0.3% Sn, and 0.02% Co showed the smallest weight loss. Effects of current density, temperature, and other factors were also investigated. Tables and graphs. 20 ref.

See also:
8543 (choice of alloys for chemical industry)
8549 (brazing alloys)
8563 (uses of nitrided alloy steels)
8706 (Ti in turbojets)
8773 (Mg anodes for cathodic protection)
8778 (uses of Al and alloys)
8784 (Al connectors in electrical transmission)
8788 (Ni alloys in chemical industry)
8801 (spring steels)
9141 (use of carbide forming tools and molds for ceramics)
9711 (Al in transformers)

18. POLLUTION AND WASTES

9026* Precision of Visibility Meters. (In Russian.) N. G. Boldyrev. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1786-1791.

Develops formulas for expressing the precision of smoke meters and similar instruments for industrial applications. 10 ref.

9027 Six-Step Plan For Abating Foul Air. *Chemical Engineering*, v. 59, May 1952, p. 352, 354, 356-358. (Based on paper by C. A. Gosline.)

Outlines and discusses steps recommended in designing new processes and plants to minimize air pollution. 10 ref.

9028* Morphological Influences on the Properties of Industrial Dusts. (In German.) R. Meldau and R. H. S. Robertson. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 29, Feb. 1952, p. 27-35.

Describes studies on size and shape of different types of particles below 1μ in diam. Illustrated by a number of electron micrographs. Electron-optical studies of the problem of silicosis are also discussed. Graphs and tables. 27 ref.

9029 A Freeze-Out Apparatus For the Collection of Air Contaminants. Edmund Thelen and Samuel N. Muchnick. *Journal of the Franklin Institute*, v. 253, May 1952, p. 505-506.

Describes above apparatus designed to permit the entrapment of analyzable quantities of atmospheric contaminants in a relatively brief period of time. Thermal efficiency tests indicate the equipment is capable of cooling as much as 2.5 cu. ft. of air per minute to −183°C. Photograph.

9030 Dry Dust Collectors For Industry. J. M. Dallavalle. *Heating and Ventilating*, v. 49, June 1952, p. 103-110.

Principles, design, and applications of dry inertial and motor-powered separators. Schematic diagrams.

9031 Atmospheric Pollution. Louis C. McCabe. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 121A-122A.

Tests indicate that electrostatic precipitators, when operated wet are highly efficient for the recovery of fumes and gases from Al-alloy processing.

9032* A Critical Review of the Litreature of 1951 on Sewage, Waste Treatment, and Water Pollution. W. Rudolfe. *Sewage and Industrial Wastes*, v. 24, May 1952, p. 541-641.

Subdivisions of this review by the FSIWA Committee on Research are: analytical methods, sewage, industrial wastes, radioactivity, and water pollution. Specific topics of metallurgical interest include determination of cyanides and metallic ions; pickling and acid, and plating and cyanide wastes. 800 ref.

9033* Analysis of Polluted Waters Capable of Photosynthesis. W. E. Abbott. *Sewage and Industrial Wastes*, v. 24, May 1952, p. 666-669.

Oxygen photosynthesized by exposure to a definite quantity of daylight, as measured by the hydrogen iodide actinometer, is recommended as a means of classifying polluted waters in which chlorophyll-containing organisms have developed.

9034* Profits From Metal Wastes. C. F. Paulson. *Water & Sewage Works*, v. 99, May 1952, p. 199-201.

New ion-exchange process using Permutit resins recovers chromic acid and demonstrates other operating advantages.

9035* Purification of Gases by Bag Filters and Cyclone Separators. (In German.) Werner Sauermann. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 5, May 1952, p. 185-191.

Describes characteristics of bag filters, cyclone separators, and dust centrifuges. Industrial uses of specialized types are outlined. Diagrams.

Miscellaneous Publications

9036 The Spectrum of Particle Size and Its Relation to Air Pollution. Hammett P. Munger. "Air Pollution: Proceedings of the United States Technical Conference on Air Pollution". (McGraw-Hill, New York), 1952, p. 159-164; disc., p. 164-166.

Graphs show particle-size ranges for various types of aerosols, dusts, and fumes found in the atmosphere. Describes method using Kytoons (kite-balloons) for sampling air from any altitude up to 500 ft. or higher. 14 ref.

Books

9037 Air Pollution: Proceedings of the United States Technical Conference on Air Pollution. Louis C. McCabe, chairman. 847 pages. 1952. McGraw-Hill, New York. (TD884 Un3a)

97 papers subdivided as follows: 14 on agricultural aspects; 14 on analytical methods and properties; 24 on control equipment and procedures; 14 on health aspects; 14 on instrumental methods for investigation or recording of air pollutants; 9 on legislative aspects; and 8 on meteorological aspects.

9038 Air Pollution and Smoke Prevention Association of America, Proceedings, 44th Annual Convention. 146 pages. 1951.

Verbatim report of discussions, etc., (42 pages), is followed

by 30 papers on various aspects of air-pollution a smoke-prevention problems.

19. FUEL TECHNOLOGY

9039* Combustion of Coal Particles Moving in a Stream of Gas. (In Russian.) Z. S. Leont'eva. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1801-1811.

Experiments were made on the above. Equipment is schematically illustrated. Data are tabulated and charted.

9040* Investigation of Crack Formation in Layers of Coking Coal. (In Russian.) A. E. Bresler and Iu. I. Zakolodkina. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1841-1848.

A study was made of the role of crack formation in the coking process. The influence of temperature and of depth of the layer was also studied. Tables and graphs.

9041 Fluctuations In A Spray Formed by Two Impinging Jets. Marcus F. Heidmann and Jack C. Humphrey. *Journal of the American Rocket Society*, v. 22, May-June 1952, p. 127-131, 167.

Investigation of the above indicates that, upon impingement, a ruffled sheet of liquid is formed which disintegrates intermittently to form groups of drops which appear as waves propagating from the point of impingement. Effect of various injector parameters on frequency of wave formation and on the spray pattern was investigated because of its possible relation to combustion instability.

9042* Characteristics and Development of Naval Fuel Oils. M. Blanchier. *Journal of the American Society of Naval Engineers*, v. 64, May 1952, p. 408-424 .(Reprinted from *Institute of Marine Engineers, Transactions*, Oct. 1951.)

Discusses various aspects, including sulfur content, ash content, effects of accidental introduction of sea water, behavior at low temperatures, stability and compatibility, explosive vapor content, asphalt, heavy fuels and gas turbines, and boiler fuels in marine diesels.

9043* Calorimetric Determinations on Semibituminous Coals Using Differential Thermal Analysis. (In English.) Carl M. Gamel, Jr., and W. J. Smothers. *Analytica Chimica Acta*, v. 6, May 1952, p. 442-449.

Apparatus and procedure. Graphs and tables.

9044 Some Recent Advances in Fuel Technology. C. C. Hall. *Blast Furnace and Steel Plant*, v. 40, May 1952, p. 542-545.

Outlines some of the development that are contributing, or which it is hoped will, in the future, contribute, to conserving British coal resources.

9045* Coking-Property Determinations and Their Practical Importance. (In German.) H. Mainz. *Brennstoff-Chemie*, v. 33, Apr. 23, 1952, p. 124-129.

Shows that previous methods of investigating above determine bonding power rather than baking properties of coal. Factors that affect coking properties and methods of improving them are discussed. Tables, graphs, and photographs.

9046* Fully Mechanized Coal Gasification. (In German.) O. Pistorius. *Brennstoff-Wärme-Kraft*, v. 4, Apr. 1952, p. 128.

Briefly describes and illustrates a new German gas producer, known as the "Demag-P-H" producer, said to be highly effective for operation on all kinds of carbonaceous solid fuels.

9047* Coal Hydrogenation Process Studies. III. Effects of Time on Restricted Hydrogenolysis of Spitsbergen Coal With Adkins Catalyst. E. Falkum and R. A. Glenn. *Fuel*, v. 31, Apr. 1952, p. 133-152.

Effects of a number of variables for the range 275-388°C. for 72 hr. using Adkins catalyst with no vehicle and a cold hydrogen pressure of 1800 psig. were studied. A mechanism is presented to explain the reactions taking place during restricted hydrogenolysis of coal.

9048* Action of Solvents on Coal at Lower Temperatures. IV. Characteristics of Extracts and Residues From the Treatment of Coal With Amine Solvents. I. G. C. Dryden. *Fuel*, v. 31, Apr. 1952, p. 176-199.

Experiments are described on coal-extraction products obtained with ethylene diamine, especially those from lower-rank coals. The application of precipitation by nonsolvents and by ions, dialysis and electrodialysis, chromatography, electrophoresis, chlorination, condensation with amines, and heats of wetting are reported. 26 ref.

9049* A Laboratory Method for Measuring Some Combustion Properties of Solid Fuels. J. A. Dulhunty and B. L. Harrison. *Fuel*, v. 31, Apr. 1952, p. 220-225.

Apparatus diagram, procedure, and typical results.

9050* Generation of Water Gas in Large Horizontal-Chamber Furnaces. (In German.) Walter Ahlers. *Gas- und Wasserfach*, v. 93, Jan. 1, 1952, p. 5-15; Feb. 1, 1952, p. 69-70.

Review of literature includes computation of equilbrium, output, and analysis of water gas. Data are graphed and tabulated. 54 ref. (To be concluded.)

9051 Oil Gas Manufacture; A Staff-Industry Collaborative Report. William Q. Hull and W. A. Kohlhoff. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 936-948.

Reviews history of the above. Gives detailed information on procedure and equipment of the Portland, Ore., plant of Portland Gas and Coke Co. Numerous diagrams, illustrations and charts. 30 ref.

9052 Gasification of Solid Fuels. C. C. Wright. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1028-1082.

Part of symposium presented at ACS meeting: Presents kinetic data on which to base process design calculations and new information on the theoretical aspects of gasification and combustion. Numerous graphs, tables, and diagrams. Following separate papers are included: "Mode of Energy Release in Combustion of Carbon," J. R. Arthur and J. A. Bleach; "Reactions of Artificial Graphite: Kinetics of Oxidation of Artificial Graphite at Temperatures of 425° to 575°C. and Pressures of 0.15 to 9.8 cm. of Mercury of Oxygen," "Surface Oxide Formation and Surface Roughness Studies in Relation to Oxidation of Artificial Graphite at Temperatures of 25°C. and Between 425° and 575°C.", Earl A. Gulbransen and Kenneth F. Andrews; "Mechanism of the Oxidation of Graphite at Temperatures of 425° to 575°C., Earl A. Gulbransen: "Reaction of Carbon Dioxide With Pure Artificial Graphite at Temperatures of 500° to 900°C.", Earl A. Gulbransen and Kenneth F. Andrew; "Kinetics of Carbon Gasification by Steam: Effect of High Temperature Pretreatment on Reactivity of Low Temperature Char to Steam and Carbon Dioxide," "Effect of Pressure and Carbon Burnoff on Rate of Interaction of Low Temperature Char With Steam-Hydrogen Mixtures at 1600°F.," G. E. Goring, G. P. Curran, R. P. Tarbox, and Everett Gorin; "Catalytic Reverse Shift Reaction; A Kinetic Study," L. W. Barkley, T. E. Corrigan, H. W. Wainwright, and A. E. Sands; "Gasification of Solid Fuels at Elevated Pressures," Wilhelm Gumz; "Gasification of Pulverized Coal With Oxygen and Steam in a Vortex Reactor," M. A. Elliott, Harry Perry, James Jonakin, R. C. Corey,and M. L. Khullar. 161 ref. (Another group of papers from the symposium will be published in the July issue.)

9053 Evidence For the Cyclic Structure of Bituminous Coals. H. C. Howard. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1083-1088.

Graphs and tabular data. 28 ref.

9054 Powdered-Coal Gasification; Effect of Variables. John J. Sebastian. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1175-1184.

Describes apparatus and procedure developed for preliminary testing of powdered solid fuels for their relative value in synthesis-gas production. Flow diagram, tables, graphs, and illustrations.

9055* Coke-Making From Hokkaido Coal for Blast. (In English.) Kiyoaki Hisada. *Japan Science Review*, v. 2, Apr. 1951, p. 107-111.

The author has made strong coke from Hokkaido high-volatile coal by blending 25% semi-coke ground smaller than 0.3 mm. The semi-coke is made from non-caking coal in Hokkaido, and its highest volatile matter content is 20%. Tables and graphs.

19. *Fuel Technology*

9056 Polymer Formation in Hydrocarbon Flames. N. Thomas. *Journal of Chemical Physics*, v. 20, May 1952, p. 899-904.

A theory is developed to account for certain experimental phenomena occurring in hydrocarbon flames. It postulates formation of highly unsaturated chain polymers and their subsequent rapid breakdown to active fragments and oxidation of these. The theory is applied to a number of examples of experimental data on hydrogen flames. A mathematical discussion of breakdown of chain polymers by self-oscillation is given. 26 ref.

9057 Pressure Dependence of Quenching Distance of Normal Heptane, Iso-Octane, Benzene, and Ethyl Ether Flames. Raymond Friedman and W. C. Johnston. *Journal of Chemical Physics*, v. 20, May 1952, p. 919-920.

9058* Low Temperature Carbonization of Coal. A. Lahiri. *Journal of Scientific & Industrial Research*, v. 11A, Apr. 1952, p. 146-158.

Discusses various processes for the above, with emphasis on their applicability to Indian conditions.

9059* Investigation on High Sulphur Assam Coals. Part I. Desulphurization. Part II. Sulphur Compounds in Coal. J. K. Chowdhury, P. B. Datta, and S. R. Ghosh. *Journal of Scientific & Industrial Research*, v. 11B, Apr. 1952, p. 146-152.

Data tabulated and discussed. 19 ref.

9060 Flame Propagation in Cylindrical Tubes. Philip Levine. *Mechanical Engineering*, v. 74, June 1952, p. 483-485, 489.

A study of the above for a mixture of propane and air. Results cover velocities of flame propagation and combustion and effects of air-fuel ratio and of tube position. Apparatus and other diagrams, and graphs.

9061* Pressure in the Explosion and Diffsuion Flames. (In German.) H. Stampfer. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 448-454.

Describes experiments with low-oxygen and slightly explosive gas-air mixtures, which illustrate in a simple manner the effect of flame gases on preservation of the flame at the burner. Diagrams and graphs.

9062 Optical Systems for Increasing the Available Intensity From Flames. Earle K. Plyler and Henry J. Kositkowski. *Journal of the Optical Society of America*, v. 42, May 1952, p. 360.

Discusses the above. Diagram shows system utilizing 4 solid angles.

9063 The Oxidation of Hexane in the Cool-Flame Region. H. C. Bailey and R. G. W. Norrish. *Proceedings of the Royal Society*, ser. A, v. 212, May 7, 1952, p. 311-330.

Chemical nature of the cool flame of C_6H_{14} at 300°C., maintained stationary in a flow system at atmospheric pressure, was investigated. Relative intensities of cool flames obtained from mixtures of differing composition were measured, and correlated with analyses of the reaction products. Results are examined in the light of a theory of combustion of higher hydrocarbons via aldehydes and hydroxyl radicals. Numerous graphs. 30 ref.

9064* Construction and Operating Principles of Fireboxes For Use of Cut Peat. (In Russian.) E. V. Kolobanov. *Za Ekonomiiu Topliva*, v. 9, Jan. 1952, p. 1-3.

Discusses the above and presents data from tests. Includes sketches.

9065* Partial Replacement of Air by Oxygen in Gas Generators During the Steam-Air Blow. (In Russian.) G. I. Deshalit. *Za Ekonomiiu Topliva*, v. 9, Jan. 1952, p. 14-45.

Discusses improvement of generator gas due to the above. Tables and graphs.

See also:
9081 (progress in domestic heating research)
9129 (transactions of World Power Conference)
9236 (combustion of cellulose materials)
9253 (commercial burner-oil specifications)
9407 (thermodynamics of combustion gases)
9470 (oxidation of propane)
9840 (bituminous coal economics)

20. HEATING, DRYING, AND AIR CONDITIONING

9066* A Continuous Drying Process for Peanuts. Vernon H. Baker, Buford M. Cannon, and James M. Stanley. *Agricultural Engineering*, v. 33, June 1952, p. 351-356.

Equipment described, diagrammed, and illustrated. Experimental data tabulated and charted. 12 ref.

9067* Heating Water With the Heat Pump. Andrew Hustrulid and H. A. Cloud. *Agricultural Engineering*, v. 33, June 1952, p. 357-359.

Describes experimental work on the above. Equipment diagrammed and illustrated; data tabulated and charted.

9068* Operation and Performance of Modern Reheat Boilers. P. R. Loughlin and H. H. Poor. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 529-533; disc., p. 534-535.

Illustrates typical designs and discusses operating procedures for normal start-up, quick start-up, normal operation, and shutdown under normal or emergency conditions.

9069* Some Design Factors Relating to Performance and Operation of Reheat Boilers. H. H. Hemenway. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 537-543.

Reheat boilers designed to operate with low furnace exit-gas temperatures and at the same time provide control of superheater and reheater-outlet steam temperatures over a wide load range are illustrated and described. Various means for controlling primary and reheat-steam temperatures are discussed. Some advantages and disadvantages of indirect reheating are given.

9070* A Progress Report of Reheat Boiler Design and Operation. W. J. Vogel and E. M. Powell. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 545-550.

At the Annual Meeting of ASME in 1948, representatives of various manufacturers of boilers and turbines reviewed the history of reheat and described designs then being offered. Discusses performance of several of these new units and some special features of their operation. Diagrams and graphs.

9071* Station Design With Cyclone-Fired Steam Generators. H. C. Schroeder and R. J. Strasser. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 573-578; disc., p. 578.

Need for finding better methods of burning Central Illinois coal led to the cyclone-furnace development. Station design for cyclone-fired steam generators is treated as well as engineering design features of the installations now in operation. Consideration is also given to units in process of design and construction.

9072* Marine Steam Oil Atomizers. J. F. Harvey. *Journal of the American Society of Naval Engineers*, v. 64, May 1952, p. 301-330.

Gives details of construction and operation. Schematic diagrams show various types used on oil burners.

9073 The Influence of Aging Factors on the Emissivity of Reflective Insulations. F. C. Hooper and W. J. Moroz. *ASTM Bulletin*, May 1952, p. 92-95.

Includes foreward by E. A. Allcut and a study of the above on metal foil subjected to such conditions as atmospheric exposure and spraying with dilute chemical solutions. Tables and graph.

9074* Radio-Frequency Heating. *Brown Boveri Review*, v. 38, Nov. 1951, p. 315-371.

Entire issue is devoted to a series of articles on various aspects of the above. Introductory section is followed by sections on equipment, application to metals, application to nonconductors, and theoretical aspects.

9075* Contribution to the Analytical and Experimental Study of the Variations of Temperature of Electric Furnaces as a Function of Time and Fuel Supplied. (In French.) M. Billy and J. Brefort. *Chaleur & Industrie*, v. 33, Apr. 1952, p. 98-106.

Presents a theoretical study of the thermal characteristics of electric furnaces and discusses experiments conducted on the above. Includes charts.

9076* Causes of Fouling of the Firing Surfaces of Boilers, Economizers, and Air Heaters, and Means for Its Prevention. (Concluded.) (In French.) G. Costes. *Chaleur & Industrie*, v. 33, Apr. 1952, p. 107-118.

Discusses the above with respect to deposits of melted ash, means of protection against deposits, and cleaning of the heating surfaces. Graphs.

9077* Chemical Heat Storage For Heat Pumps. *Edison Electric Institute Bulletin* v. 20, May 1952, p. 168-172.

A progress report prepared by the joint AEIC-EEI Heat Pump Committee. Describes laboratory tests to determine the reversibility of disodium phosphate dodecahydrate, amount of heat released and absorbed by the salt during each cycle, necessary length of the heating and freezing cycle between 80 and 115°F., and amount of corrosion of the inside and outside of the containers. Apparatus is diagrammed and illustrated; data are charted.

9078* Fuel Distributor For Chain-Grate Stokers. *Engineering*, v. 173, May 2, 1952, p. 565.

Equipment made by a European firm. Diagram and illustration.

9079 Effectiveness and Temperature Requirements for Cooling Panels Removing Internal Radiation. Merl Baker. *Heating, Piping & Air Conditioning*, v. 24, June 1952, p. 118-124.

Presents a simplified theoretical analysis of the removal of internal radiation by use of cooling panels. Equations are developed by which the effectiveness of enclosed radiant-energy sources in heating room air, and expressions for cooling-load requirements can be determined. 11 ref.

9080* Thermal Aspects of Furnace Design. C. Hulse and R. J. Sarjent. *Journal of the Institute of Fuel*, v. 25, May 1952, p. 94-102.

Recent developments in applying the laws of heat transmission to furnaces are discussed, the problem being treated as one calling for simultaneous solution of equations covering the various factors in heat transmission. Attempts to determine relative magnitudes of heat transfer due to convection and to radiation. 40 ref.

9081* Progress in Domestic Heating Research. A. C. Monkhouse. *Journal of the Institute of Fuel*, v. 25, May 1952, p. 103-107; disc., p. 107-108.

Above is described, reference being made to the measurement of radiation, convection, water heating, and air flow, and to the contribution made by research organizations and by industry. Work on the influence of insulation of houses, and on the relation of the heating appliance to the house, is outlined, together with research on effect of environment on physiological and comfort conditions. Means to avoid emission of smoke are indicated. Improvements in methods of producing high-temperature coke of higher combustibility are described. District heating and the heat pump are discussed. 13 ref.

9082* An Investigation of Whole-House Heating. F. C. Lant and J. C. Weston. *Journal of the Institute of Fuel*, v. 25, May 1952, p. 109-114; disc., p. 114-117.

Temperature, fuel consumption, and expenditure for houses with various forms of central heating are given and compared with data for conventional heating arrangements. Applicability in Britain is discussed.

9083* Progress Review No. 19; Gas Burners. J. F. Waight. *Journal of the Institute of Fuel*, v. 25, May 1952, p. 118-121.

Surveys the various types, their advantages and disadvantages, and literature on them. 27 ref.

9084 Low-Load Operation of Spreader Stokers. *Mechanical Engineering*, v. 74, June 1952, p. 458-464.

Presents a panel discussion consisting of following titles: "Operating Spreader Stokers at Light Loads", F. C. Messaros; "How to Select Spreader-Stoker Equipment", Max O. Funk; "Light-Load Design Features for Spreader Stokers", Herbert L. Wagner; "Practical Suggestion on Low-Load Operation of Spreader Stokers", Earle C. Miller; and "How to Achieve Smokeless Operation of Spreader Stokers", D. J. Mosshart.

9085* Natural Draft and Forced Draft. (In French.) J. E. Lafon. *Métallurgie et la Construction Mécanique*, v. 84, Mar. 1952, p. 175, 177, 179, 181; Apr. 1952, p. 251, 253, 255.

Compares above 2 systems as applied to industrial furnaces, especially the regenerative type. Schematic diagrams illustrate principles discussed.

9086* Pneumatic Sorting of Mine-Run Coals While Burning Them on Chain Grates. (In Russian.) I. A. Iavorskii. *Za Ekonomiiu Topliva*, v. 9, Jan. 1952, p. 9-13.

Diagrams and graphs show principle of above equipment and its performance.

9087* Standardization of Heat Losses in Heating Systems. (In Russian.) E. P. Shubin and A. P. Safonov. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 12-17.

A mathematical discussion.

9088* Methods of Planning and Standardizing the Consumption of Heat and Fuel for the Heating of Buildings. (In Russian.) L. A. Melent'ev. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 17-21.

Discusses the above as a national-economic problem and considers heat balance of buildings and various heating systems.

9089* Burning Wood Waste and Chips in Vortex Burners of the Kolobanov Type. (In Russian.) A. K. Slednikov. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 33-34.

A vortex burner designed for cut peat was found to be very satisfactory for utilizing chips and other industrial wood waste. Details of the furnace are illustrated; operating data are tabulated.

9090* Volumetric Meters for Measuring the Consumption of Coal for Boilers With Chain Grates. (In Russian.) S. L. Liadov and R. Ia. Ter-Minasov. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 36-37.

Equipment for the above is described and illustrated.

Books

9091 Nagrev Metalla; Teoriia i Metody Rascheta. (Heating of Metals; Theory and Methods of Calculation.) G. P. Ivantsov. 191 pages. 1948. Government Scientific-Technical Publishing House for Literature on Ferrous and Nonferrous Metallurgy, Sverdlovsk and Moscow, U.S.S.R. (TN672 Iv1n)

Mathematical bases of the theory of heating metals in furnaces under different conditions of heat exchange. Original and classical methods for calculating time of heating. Formulas, tables, and graphs are presented, and their application illustrated by numerous numerical examples.

21. PRIME MOVERS

9092* Civilizing the Ghost. J. L. P. Brodie. *Aeroplane*, v. 82, May 2, 1952, p. 529-534.

Discusses problems in developing a civil version of the De Havilland Ghost gas turbine. Schematic diagram and illustrations.

9093* Russian Light Aircraft Projects. *Aeroplane*, v. 82, May 16, 1952, p. 604.

Diagrams and brief descriptions of some light planes which won prizes in a Soviet contest.

9094* A Simplified Theory of Jet Propulsion. J. Lockwood Taylor. *Aircraft Engineering*, v. 24, May 1952, p. 131.

Shows how the performance of a jet engine can be calculated on very simple assumptions, and that the results so obtained agree reasonably well with known performance. The analysis can easily be extended to the turboprop engine.

21. *Prime Movers*

9095* High Temperature Propellent Reactions. F. E. Osborne. *Aircraft Engineering*, v. 24, May 1952, p. 134-137.

Determination of the thermodynamic properties of their gaseous products for use in heat-engine calculations. Equations and tabular data.

9096* Turbine Stresses in Aero-Engines. D. A. Drew. *Aircraft Engineering*, v. 24, May 1952, p. 138-140, 141.

Concentrates upon those features and the equipment used by Rolls-Royce which differ from those normally used in the United States.

9097 Injector Spray and Hydraulic Factors in Rocket Motor Analysis. Kurt R. Stehling. *Journal of the American Rocket Society*, v. 22, May-June 1952, p. 132-138.

Compares various types of thrust-chamber injection systems. Applicability and relative merits of several common injector heads are emphasized. Use of dyed-water flow analysis and high-speed photography in injector-head spray research is described. Methods of analyzing droplet size and atomization rates are reviewed and compared. Cause and effect of hydraulic "flip" in orifice jets are discussed, as are effects of cavitation and feedback in the hydraulic system.

9098 The Transfer Functions of Rocket Nozzles. H. S. Tsien. *Journal of the American Rocket Society*, v. 22, May-June 1952, p. 139-143, 162.

Transfer function is defined as the fractional oscillating mass-flow rate divided by the fractional sinusoidal pressure oscillation in the rocket combustion chamber. This is calculated as a function of frequency of oscillation.

9099 A Similarity Law For Stressing Rapidly Heated Thin-Walled Cylinders. H. S. Tsien and C. M. Cheng. *Journal of the American Rocket Society*, v. 22, May-June 1952, p. 144-149, 167.

The cylinder of a solid propellent rocket is subjected to very rapid heating during its short duration of operation. Reduces the problem of stress analysis of above cylinders to an equivalent problem in conventional cylindrical shells without temperature gradients in the walls.

9100 Heat Flow in Composite Slabs. E. Mayer. *Journal of the American Rocket Society*, v. 22, May-June 1952, p. 150-158.

Presents solution of the heat-flow problem in composite walls under heat-transfer conditions, typical of uncooled rocket-engine walls. Analytical expressions in the form of Fourier sums are obtained for temperature distribution in a composite wall consisting of an inner (refractory) medium and an outer (metallic) medium. General results for the composite slab are simplified for the limting cases of a thin refractory shield with a thick shielded medium and a thick refractory shield with a thin shielded medium.

9101* A Contribution to the Problem of Designing Radial Turbomachines. O. E. Balje. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 451-471; disc., p. 471-472.

Method for computing characteristic values, such as pressure coefficient and efficiency of centrifugal compressors and radial inward-flow turbines, as function of Reynolds number and Mach number. Influences of blade number, blade angle, speed, and diameter ratio of the impeller on efficiency and pressure coefficient are discussed. Application for computing the characteristics of a particular turbomachine. 17 ref.

9102. Some Theoretical Aerodynamic Investigations of Impellers in Radial- and Mixed-Flow Centrifugal Compressors. J. D. Stanitz. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 473-497.

Presents numerical results of above investigations and discusses their significance with respect to improved compressor performance. 16 ref.

9103* Single-Stage Radial Turbines For Gaseous Substances With High Rotative and Low Specific Speed. W. T. Von Der Nuell. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 499-514; disc., p. 514-515.

Discusses the above, pointing out advantages for gas and air turbines when, relatively speaking, low mass flow in conjunction with high energy content per weight unit of the working substance characterize the available energy supply. Diagrams, graphs, and illustrations. 24 ref.

9104* Research in Exhaust Manifolds. P. H. Schweitzer. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 517-528.

Effect of the exhaust manifold on engine performance, particularly in two-stroke-cycle multicylinder engines, was investigated. Some aspirator-type manifolds create suction rather than back pressure and result in scavenging-air flows that are greater than obtainable not only with conventional manifolds, but even with no manifolds at all. Graphs, diagrams, and illustrations.

9105* Part Load Considerations for Gas Turbine Cycles. John J. McMullen. *Journal of the American Society of Naval Engineers*, v. 64, May 1952, p. 379-391.

A general discussion. Graphs, diagrams, and illustrations.

9106* The 4.1 Litre Commer Engine. *Automobile Engineer*, v. 42, May 1952, p. 175-180.

Describes the above, a vertical, 6-cylinder, overhead-valve engine. Photographs, diagrams, and performance curves.

9107 Continental's Gas Turbines. Whitney Collins. *Automotive Industries*, v. 106, May 15, 1952, p. 41-42, 87-88, 90. (A condensation.)

The Continental-Turbomeca gas turbines described fall generally into one of 4 groups: the shaft-power turbine, the compressed-air generator, the ducted fan, and the pure jet. Includes performance curves.

9108 Rocket Model Does Work of Windtunnel. George L. Christian. *Aviation Week*, v. 56, June 9, 1952, p. 21-22, 24.

Describes and illustrates use of a standard 5-in. military rocket equipped with a scale-model airplane wing. The rocket is fired and telemeters desired data back to the ground, eliminating need for wind-tunnel tests.

9109* Atomic-Power Plant Projects. (In German.) *Brennstoff-Wärme-Kraft*, v. 4, Apr. 1952, p. 124-125.

Diagrams of reactors and power plants illustrate brief discussion of Swiss plans for utilizing atomic energy for peaceful purposes.

9110* Gas Turbines. Part Two (b). I. G. Bowen. *Coke and Gas*, v. 14, May 1952, p. 161-166.

I. G. Bowen continues discussion of fuels for the gas turbines with particular reference to solid fuels and gases. Also outlines the corrosion problems encountered and describes methods for overcoming them. Equipment diagrams and graph. (To be continued.)

9111* A Rotary Air Compressor. *Engineer*, v. 193, May 9, 1952, p. 631-633.

In a new design of sliding-vane, rotary, air compressors now being made by a British firm, an improved method of oil sealing and a new stator profile have been introduced. Machines incorporating these developments are claimed to have a compression cycle equivalent to that of a reciprocating compressor with 3 or 4 stages, while the frictional losses are considerably less. Schematic diagrams.

9112* Tests On Gas Turbine Locomotive No. 18,000. *Engineer*, v. 193, May 16, 1952, p. 664-667.

Tests on a British locomotive. Gives particulars of power output, fuel consumption, and efficiency over the entire working range. Numerous graphs, tables, and diagrams.

9113* The Opposed-Piston Diesel Engine. George A. Mueller. *Engineering Journal*, v. 35, May 1952, p. 491-496, 502.

Traces history of development of above and discusses basic elements which make it the nearest approach to the ideal combustion engine. Design features of the locomotive type are described. Diagrams and photographs.

9114* Tests On A High-Speed Two-Stroke Cycle Opposed-Piston Diesel Engine. A. I. Ibrahim Abdelfattan. *Engineers' Digest*, v. 13, May 1952, p. 144. (Translated and condensed from Dissertation 2053, Federal Technological University (E.T.H.), Zurich, 62 pages.)

Describes tests carried out on a Sulzer 2ZG9 engine. Compara-

tive tests were made with standard Bosch-type injection equipment and with a developed accumulator injection system. Considers such aspects as fuel delivery, engine scavenging conditions, purity of cylinder charge, pressure losses, and piston temperatures.

9115 Alcohol as an Antiknock Agent in Automotive Engines. James C. Porter and Richard Wiebe. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1098-1104.

In order to obtain a better understanding of the effect of alcohol on hydrocarbon fuels, 4 base stocks—straight-run, catalytically cracked, thermally cracked, and polymer gasoline—were selected. Results for the 4 base stocks and their mixtures are given. Tests were also made on physical properties of various antidetonates, alcohol-water injection in automotive engines, and effect of mixture composition. Numerous graphs and tables. 18 ref.

9116* Researches on the Non-Aircraft Gas Turbine. (In English.) Kin'iti Nakata. *Japan Science Review*, v. 2, Apr. 1951, p. 63-86.

Gives details of Japanese work on the above. Performance curves and detailed drawings.

9117 Developments in Francis Turbines. *Mechanical Engineering*, v. 74, June 1952, p. 510-512.

Discussion, including author's reply, of paper of similar title by W. J. Rheingans (Mar. 1952 issue).

9118 Auxiliary Gas-Turbine Engine. *Mechanical Engineering*, v. 74, June 1952, p. 515-516.

Discussion, including authors' reply, of "Design Features of a 250-KW Gas-Turbine Engine Used as Drive for Shipboard Emergency Generator", R. R. Peterson and P. G. Carlson (Mar. 1952 issue).

9119 The Berger Hydraulic Starter. *Overseas Engineer*, v. 25, May 1952, p. 345-346.

Describes above mechanical unit, operated by air and oil, which provides an immediate start for heavy internal combustion engines.

9120* The Sunbury Oil Test Engine. (In English.) R. Stansfield. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 18, Feb. 1952, p. 46-62.

Describes and diagrams single-cylinder spark-ignition engine incorporating all the necessary features, including ability to measure piston and crankpin temperatures. Effects of test-engine operating variables on temperatures which critically affect lubricating-oil behavior were determined, enabling operating conditions to be selected to give piston and other temperatures which match those obtained in service without necessarily matching all the operating conditions. As an example, air-cooled aircraft-engine-piston temperatures are obtained without supercharging. By these means, correlation is shown with performance of full-scale, single-cylinder aircraft units. Reproducibility of test results and reliability of the engine have proved very satisfactory.

9121* The Aerodynamics of Guided Missiles. What Makes Them Fly? Patrick W. Powers. *United States Army Combat Forces Journal*, v. 2, June 1952, p. 19-21.

First of 3 elementary articles on the basic principles of guided missiles. Schematic diagrams. (To be continued.)

9122* Efficiency of Locomotive V-5000 Working on Mine-Run Coals. (In Russian.) P. S. Kibrik and F. P. Ianutsevich. *Za Ekonomiiu Topliva*, v. 9, Jan. 1952, p. 4-8.

Presents a discussion of the results of tests on the above. Data are tabulated. Includes diagram of the power unit.

9123* Choice of Measuring Units for Standardization of Fuel Consumption of Locomotives for Intrafactory Transportation. (In Russian.) A. D. Akimenko. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 22-23.

Includes mathematical analysis and graphical interpretation.

9124* Utilization of Waste Heat in Diesel Electric Power Stations. (In Russian.) S. A. Gorshkov. *Za Ekonomiiu Topliva*, v. 9, Mar. 1952, p. 34-35.

A system of storing waste heat from a diesel in an insulated reservoir which can later be used to warm up cold engines used at peak load times or in emergencies. Considerable saving of fuel is achieved.

Miscellaneous Publications

9125 Economic Evaluation of Fuel and Energy Sources For Railway Motive Power. T. M. C. Martin. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1229-1232; disc., p. 1232-1233. (TK1 Am35tr)

9126 Method and Graphs for the Evaluating of Air-Induction Systems. George B. Brajnikoff. National Advisory Committee for Aeronautics, Technical Note 2697, May 1952, 41 pages. (TL570 Un3t)

Graphs cover the range of supersonic Mach numbers up to 3.0. Examples are presented for an air-induction system and engine combination at two Mach numbers and two altitudes. They show that jet-engine characteristics impose restrictions on use of fixed inlets if maximum net thrusts are to be realized at all flight conditions.

9127 Effect of Changing Passage Configuration on Internal-Flow Characteristics of a 48-Inch Centrifugal Compressor. I. Change in Blade Shape. Donald J. Michel, John Mizisin, and Vasily D. Prian. National Advisory Committee for Aeronautics, Technical Note 2706, May 1952, 40 pages. (TL570 Un3t)

Experimental results shown graphically.

9128 Theory of Supersonic Potential Flow in Turbomachines. Robert H. Wasserman. National Advisory Committee for Aeronautics, Technical Note 2705, June 1952, 44 pages. (TL570 Un3t)

A general method for solving above problems for stationary or rotating coordinate systems is presented. Application to design of a compressor rotor is described. 13 ref.

Books

9129 The Transactions of the Fourth World Power Conference. Vols. I-V. W. O. Skeat and R. P. Andrew, editors. 2790 pages. 1952. Percy Lund, Humphries & Co., Ltd., London. (TJ5 W89t)

First volume consists of preface, list of conferences, opening and closing session and papers on energy resources and power developments. Vol. II contains papers on preparation of solid, liquid, and gaseous fuels. Vol. III contains papers on steam power generation, miscellaneous fuels, internal-combustion engines, gas turbines, and jet engines. Vol. IV contains papers on hydroelectric generation, atomic energy, and other sources of energy. Vol. V consists of subject and author indices.

See also:
9185 (lubricant foaming in aircraft engines)
9195 (bearing problems in aircraft gas turbines)

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9130* Thermal Changes of $BaTiO_3$ Single Crystals. (In Russian.) I. N. Beliaeve, N. S. Novosil'tsev, E. G. Fesenko, and A. L. Khodakov. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 675-676.

Results of investigation are charted and discussed.

9131* Influence of Temperature on Spectral Transmission of Colored Glass. (In Russian.) S. G. Iurov and V. S. Khazanov. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1792-1800.

An experimental study was made of the above. Apparatus and procedure are described. Test data are charted.

9132 The System Alumina—Gallia—Water. V. G. Hill, Rustum Roy, and E. F. Osborn. *Journal of the American Ceramic Society*, v. 35, June 1, 1952, p. 135-142.

A study of the above resulted in determination of equilibrium diagrams for the systems Al_2O_3-Ga_2O_3 and Al_2O_3-H_2O-Ga_2O_3·H_2O. 10 ref.

9133 Wetting of Al_2O_3-SiO_2 Refractories by Molten Glass. II. Effect of Wetting on Penetration of Glass in Refractory. J. E. Comeforo and R. K. Hursh. *Journal of the American Ceramic Society*, v. 35, June 1, 1952, p. 142-148.

Indicates the importance of wetting behavior of molten glass

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to its rate of penetration into the refractories studied in Part I. Principles concerning penetration of liquids into porous solids are discussed. Rate of penetration of glass into the refractories was evaluated by 2 methods with good correlation.

9134 A Method for Measuring the Flow Point of Glass. Howard R. Lillie. *Journal of the American Ceramic Society*, v. 35, June 1, 1952, p. 149-155.

Need for a new reference point for glasses, at a temperature well above the softening point, is discussed from the standpoint of development of new glasses, control of properties, and behavior in applications where reworking is required. An apparatus and a procedure are described in which a fiber-elongation test indicates the "flow-point". Effect of infrared absorption is examined, and a correction curve given for use when such absorption is abnormally great.

9135 Density, Expansivity, and Viscosity of Molten Alkali Silicates. L. Shartsis, S. Spinner, and W. Capps. *Journal of the American Ceramic Society*, v. 35, June 1, 1952, p. 155-160.

Densities and viscosities of melts in the systems Li_2O-SiO_2, Na_2O-SiO_2, and K_2O-SiO_2 were measured with a restrained-sphere apparatus in the range 1000-1400°C. 16 ref.

9136* Experiences With Refractory Materials for Coke Ovens and Steam Boilers. (In German.) H. H. Müller-Neuglück. *Brennstoff-Chemie*, v. 33, Apr. 23, 1952, p. 119-124.

Evaluates refractory materials from an economic point of view. Photographs and tables.

9137 pH/Viscosity Relationships in the System Zirconia-Water-Polyvinyl Alcohol-Hydrochloric Acid. P. D. S. St. Pierre. *Transactions of the British Ceramic Society*, v. 51, Apr. 1952, p. 260-268.

pH/viscosity relationships are given for some zirconia suspensions. It is shown that the viscosity of a slip is determined by pH, particle size, and percentage of solids present.

9138 Asbestos Floats. M. S. Badollet. *Canadian Mining and Metallurgical Bulletin*, v. 45, May 1952, p. 275-279; *Transactions of the Canadian Institute of Mining and Metallurgy*, v. 55, 1952, p. 185-189.

Asbestos floats are defined as blends of airborne particles of fibrous asbestos and dusts produced during the milling stages and collected by Cottrell precipitators, dust sheds, or baghouses. Presents comprehensive description of properties, classification and other procedures for processing, and uses in a wide variety of industrial products. 14 Canadian asbestos floats were examined.

9139 Cadmium and Selenium Pigments in Porcelain Enamels. Paul A. Huppert. *Ceramic Age*, v. 59, Apr. 1952, p. 50-51; May 1952, p. 38-39.

Part I deals with the composition and production of cadmium pigments. Part II discusses special frits, mill additions, and typical defects and probable sources. 44 ref.

9140 Ferrite Compounds With More Than Three Oxide Components. E. Albers-Schoenberg. *Ceramic Age*, v. 59, May 1952, p. 30, 32-35.

Flux density and permeability curves of several compositions of the system NiO-ZnO-CuO-Fe_2O_3 and MgO-NiO-ZnO-Mn_2O_3-Fe_2O_3 between −50°C. and temperature close to the Curie point are presented. For the system NiO-ZnO-CuO-Fe_2O_3, favorable working conditions are explained by means of a triaxial diagram. Numerous graphs. 14 ref.

9141* Cemented Carbides Give Longer Life to Forming Tools, Molds. J. S. Leibson. *Ceramic Industry*, v. 58, June 1952, p. 100-101.

Discusses application of carbides at General Electric Co.'s Porcelain Mfg. Div., Schenectady, for production of ceramic insulators. Used for lathe work; drilling, counterboring, and reaming; and mold work. They have eliminated an average of 11 of every 12 tool grinds.

9142* How To Get a Copper Red Glaze By the Surface Reduction Method. F. Carlton Ball. *Ceramic Industry*, v. 58, June 1952, p. 115, 117.

9143* Crystal Glazes. *Ceramics*, v. 4, Apr. 1952, p. 56, 58-63.

A review covering types of above and conditions and factors affecting crystallization. Photographs and formulas. 12 ref.

9144* Sillimanite Refractories. W. L. German. *Ceramics*, v. 4, May 1952; p. 104-106, 108-110.

A descriptive review. 20 ref.

9145* Felspars in Ceramic Bodies. I. C. McDowall and W. Vose. *Ceramics*, v. 4, May 1952, p. 114-120. (Extract from "Felspars and Their Use in Ceramic Bodies of the Type Felspar-Clay-Quartz", New Zealand Pottery and Ceramic Research Assn., Technical Report 6, May 1950.)

A descriptive review. 22 ref.

9146 Refractory Concrete; A Review of a Versatile Constructional Material. A. E. Williams. *Chemical Age*, v. 66, May 10, 1952, p. 721-724.

9147* Soluble Salts in Bricks and Brickwork. *Claycraft*, v. 25, Apr. 1952, p. 393-397.

Summaries of 4 papers dealing with kiln scum (S. T. E. Davenport); practical significance of laboratory tests (B. Butterworth); works control of soluble salts (J. R. Harding and R. T. Laird); and brown staining on mortar joints in woodwork. (W. Noble).

9148* Measuring Plasticity With Special Consideration for Practical Requirements. (In German.) M. Linseis. *Berichte der Deutschen Keramischen Gesellschaft e. V. und des Vereins Deutscher Emailfachleute e. V.*, v. 29, Feb. 1952, p. 35-37.

Describes and illustrates a simple instrument for measuring tensile strength and shear resistance of ceramic materials as a means of evaluating their respective plasticities. Includes a study on effects of different clay minerals and additions on tensile and shear strength of ceramic bodies.

9149 The Use of Phosphorus in Vitreous Enamels. Harold P. Cahoon. *Finish*, v. 9, June 1952, p. 39-41.

Describes research on preparation, application, and properties of luminescent pigment. Base was 24-ga. enameling iron.

9150* Anti-Bacterial Cement Gives Longer Lasting Floors. David Levowitz. *Food Engineering*, v. 24, June 1952, p. 57-60, 134-135.

Active germicide incorporated in cement is said to permanently check bacteria that break down masonry, thus reducing costly maintenance. When used on walls and ceilings, it inhibits molds and fungi, thus controlling odors and diseases. Developed by North American Cement Corp., New York City. Describes 20 varied installations where good results have been obtained.

9151 The Annealing of Flat Glass. E. V. Condon. *Glass Industry*, v. 33, June 1952, p. 307, 322-323.

Letter to the Editor calls attention to an interesting property of the data contained in the translation of a paper by Boris Daragan, Feb. issue. A glance at the curves shows that density approaches its equilibrium value in a way that qualitatively resembles an exponential curve. When the data are plotted on semi-log paper, it is apparent that variation of density with time requires for its representation the sum of several exponential terms with different relaxation times.

9152 Applications of Nickel Compounds in Ceramics. Cameron G. Harman and Burnham W. King. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1015-1017.

The various uses in the ceramic industry of Ni and Ni compounds are discussed in some detail. Most of the discussion concerns ceramic products in which Ni compounds form some part of the composition. In addition, a brief review is given of the use of Ni in equipment for the production of ceramic products.

9153 Fundamental Investigation of Steel Plant Refractories Problems. II. The System CaO-FeO-Al_2O_3-SiO_2. Arnulf Muan and E. F. Osborn. *Industrial Heating*, v. 19, May 1952, p. 905-906, 908, 910, 912, 944, 946, 948.

A study in the basic, or low-silica part of the above system. (To be continued.)

9154 Refractories Symposium. *Iron and Steel Engineer*, v. 29, May 1952, p. 79-85; disc., p. 85-87.

Contains following papers: "Experiences With Castable and

Rammed Refractories", J. E. Deegan; "Application of Rammed Castable Refractories in Steel Mills", Robert R. Fayles; "Experiences With Refractory Concrete", William N. Horko; "Advantages of Rammed and Cast Refractories For Steel Plant Use", R. E. Wolfensperger. Photographs and diagrams.

9155 Direct Determination of the Sublimation Energy of Carbon. Th. Doehaerd, Paul Goldfinger, and F. Waelbroeck. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 757.

Rates of evaporation from a hot carbon surface and of effusion from a graphite furnace were investigated over the range 2450-2840°K. Results lead to the spectroscopic value 141.26 kcal. for the heat of sublimation. Graph. 14 ref.

9156 On the Mechanism of Evaporation of Graphite. F. Waelbroeck. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 757-758.

A discussion with comparison of theoretical and experimental values. Graph.

9157 Recent Determinations of the Vapor Pressure of Graphite. Leo Brewer. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 758-759.

A discussion, particularly of the recent note by Doehaerd, Goldfinger, and Waelbroeck which is abstracted above.

9158 Titration Curves of the Clay Minerals Attapulgite and Nontronite. R. P. Mitra and H. B. Mathur. *Journal of Physical Chemistry*, v. 56, May 1952, p. 633-637.

Above minerals show 3 inflections in their potentiometric and conductometric titration curves, indicating 3 stages of neutralization with the base. Features of the curves are discussed in relation to the lattice structures of the minerals and to factors which are known to play a part in ionic reactions on surfaces. Graphs. 23 ref.

9159 New Developments in Porcelain and Ceramic Coatings. Philip O'Keefe. *Materials & Methods*, v. 35, May 1952, p. 87-89.

One-coat enamels, improved enameling stock, and coatings having improved high-temperature, abrasion, and impact properties. Illustrated.

9160 Intricate Forming of Glass Accomplished by New Photochemical Method. Kenneth Rose. *Materials & Methods*, v. 35, May 1952, p. 94-95.

"Chemical machining" method developed by Corning and used on special photosensitive glass replaces machining operations such as drilling, cutting, engraving, and sand blasting, and produces patterns hitherto considered impossible in glass. Illustrated.

9161* A Discussion of Certain Factors Related to Modification of Refractory Linings. C. R. Atherton. *Pit and Quarry*, v. 44, May 1952, p. 101-104, 127.

Concerns evaluation of special lining installations for rotary kilns and similar equipment. Diagrams.

9162* Modern Design Principles in Pyro-Processing. Part I. Heat Transfer Classifications, Pre-heating. Wolf G. Bauer. *Pit and Quarry*, v. 44, May 1952, p. 116-124, 126-127.

Makes equipment classification based on heat-transfer principles, and discusses equipment and its design from a processing standpoint, rather than that of mechanics. Equipment covered is applicable to a wide variety of metallic and nonmetallic minerals. Flow diagrams and table. (To be continued.)

9163* Some Refractories Problems in Steelworks. G. Reginald Bashforth. *Refractories Journal*, v. 28, Apr. 1952, p. 142-156; disc., p. 157-160.

9164* Development in Rock Products and Concrete Industries in Europe. F. O. Anderegg. *Rock Products*, v. 55, May 1952, p. 70-79.

Includes introduction by F. O. Anderegg; plus the following articles: "Building Research Congress Held In London" (anon); "Rubble From Bombing Converted Into Aggregate For Rebuilding Germany" (anon); "Lime-Sand Stuccos In Europe" (anon); "European Cement Manufacture" (anon); "Hydraulic Lime Manufacture" (anon); and "Activated Lime Mortar For Stucco", Ole Glarbo.

9165* Grinding Gypsum Separate From Clinker. D. A. Wadia. *Rock Products*, v. 55, May 1952, p. 85-86.

Separate grinding and subsequent blending of gypsum and clinker are suggested to minimize false set of cement and for improved control of product and grinding procedure.

9166 Process Control in Vitreous Enamelling. H. W. Clewes. *Sheet Metal Industries*, v. 29, June 1952, p. 549-556.

Describes recommended test procedures applied to various steps and materials of above process.

9167* A Study of the Electrical Properties of Alkali-Lime-Silica Glasses, Some Containing Boric Oxide or Alumina, in Relation to Glass Structure. H. Moore and R. D. De Silva. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, Feb. 1952, p. 5-51; disc., p. 51-55.

Theoretical survey of electrical conductivity, dielectric constant, and power factors of glasses in relation to composition and structure is followed by a description of experimental observations of these and related properties of 5 series of glasses.

9168* A Photoelastic Investigation of the Hardness of Plastics and Glass. H. Holsky. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, Feb. 1952, p. 56-64.

Nature of the stress distribution set up when a cylindrical indenter is pressed into a plane surface was investigated photoelastically. When shear stress does not exceed elastic limit of the material, distribution agrees with Hertz's mathematical treatment. For higher applied stresses, plastic flow occurs some distance below the surface. For "Perspex", a linear relation exists between birefringence and strain far beyond the elastic limit. This property should be of importance in other problems of stress analysis.

9169* The Fractures Produced in Glass and Plastics By the Passage of Stress Waves. D. G. Christie and H. Kolsky. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, Feb. 1952, p. 65-73.

Fracture phenomena observed in glass and plastics when small quantities of explosive were detonated in contact with them or when they were hit by high-speed projectiles are described. Shown that the nature of the fractures produced by stress waves differs in several important respects from that found statically, and that many of the phenomena may be explained in terms of the theory of the propagation of stress waves in solids and of their reflection at free boundaries.

9170* An Investigation of Cracks and Stress Waves in Glass and Plastics by High-Speed Photography. D. G. Christie. *Journal of the Society of Glass Technology* (Transactions Section), v. 36, Feb. 1952, p. 74-89.

A high-speed spark camera is described which will take a series of 9 photographs at rates of 20,000-200,000 frames per sec. The camera was used to photograph propagation of stress waves and formation of cracks in sheets of glass and "Perspex." Illustrated results show the effects of applying pressure pulses of from 2 to 40 μsec. duration to small plates of the materials.

9171* Importance of Clay Grain Structure in the Production of Economic Sagger Masses. (Concluded.) (In German.) Siegfried Coller and Herwart Metzel. *Sprechsaal für Keramik; Glas; Email*, v. 85, Apr. 20, 1952, p. 167-169.

Discusses optimum grain-size range, effect of condition of binder on the quality of sagger masses, and permissible amount of total clay addition. Tables and graphs.

9172* Hairline Cracks in Glazes on Porous Ceramic Products. (Continued.) (In German.) W. Kerstan. *Sprechsaal für Keramik; Glas; Email*, v. 85, Apr. 20, 1952, p. 163-166; May 5, 1952, p. 189-193.

Discusses the effects of firing temperature and grain size of body components in old- and new-type furnace systems. May 5 issue summarizes causes and describes preventive measures. Diagrams, photomicrographs, tables, and graphs.

9173* Application of Moderate Preheating of Coke Oven Gas in Industrial Furnaces, Especially Glass-Melting Furnaces Operating at High Temperatures. (In German.) Johann Neumann. *Sprechsaal für Keramik; Glas; Email*, v. 85, May 5, 1952, p. 193-195.

Discusses the economic advantages of utilizing preheated coke-oven gas.

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9174* Effect of Grain-Size Distribution of Mixture Components on Melting Rate and Its Agreement With Experiences in the Melting Operation. (In German.) Harry Kalsing. *Sprechsaal für Keramik; Glas; Email,* v. 85, May 20, 1952, p. 219-223.

Shows that uniformity of grain size, rather than grain size itself, has a beneficial effect on melting rate of glass and that "stone defects" occur only when the raw material contains individual larger grains which failed to dissolve completely when the rest of the batch was melted into glass.

9175* Acid or Basic Glass-Melting Pots. (In German.) Hans Hausner. *Sprechsaal für Keramik; Glas; Email,* v. 85, May 20, 1952, p. 223-227.

Balance of advantages and disadvantages shows that the acid pot is superior to the basic pot in melting most types of glasses. Need for development of a "universal pot" for successful melting of all commercial glasses is indicated.

9176* Reduction of Stresses During Polishing of Annealed Plate Glass. (In Russian.) M. D. Tamarin and A. G. Minakov. *Steklo i Keramika,* v. 8, Nov. 1951, p. 10-12.

Discusses the above and presents curves of change in stress in relation to change in thickness of the glass.

9177* Low Melting Glaze For Ceramic Sewer Pipe. (In Russian.) L. A. Plotnikov. *Steklo i Keramika,* v. 8, Nov. 1951, p. 18-19.

Composition and properties of the above are discussed briefly. Table.

9178* Influence of Pressure on the Removal of Blisters From Quartz Glass at Time of Melting. (In Russian.) F. A. Kurliankin. *Steklo i Keramika,* v. 8, Dec. 1951, p. 13-17.

A special vacuum-compression crucible furnace was built for the above investigation. Experimental data are tabulated and charted. Diagram.

9179* A Method of Measuring the Thermal Conductivity of Ceramic Materials. (In Russian.) I. A. Al'perovich and Iu. M. Iofe. *Steklo i Keramika,* v. 8, Dec. 1951, p. 21-23.

Equipment and procedure for the above are described. Data are tabulated.

9180* Development of Building Materials and Structural Elements. (In German.) Otto Graf. *Zeitschrift des Vereines Deutscher Ingenieure,* v. 94, May 21, 1952, p. 401-408.

Brief discussion of each of numerous inorganic building materials. Includes tables, graphs, and photographs. 60 ref.

9181* Behavior and Properties of Alkaline-Earth Oxides in Silicate Glasses. (In Russian.) A. A. Appen. *Zhurnal Prikladnoi Khimii,* v. 24, Nov. 1951, p. 1122-1130.

A study was made of the effects of BiO, MgO, CaO, SrO, and BaO on the properties of silicate glasses. Tables and graphs. 14 ref.

9182* Application of a Rectangular Coordinate System to Calculation of Portland-Cement Mixtures. (In Russian.) M. I. Strelkov. *Zhurnal Prikladnoi Khimii,* v. 24, Dec. 1951, p. 1246-1256.

Describes mathematical development of above system. Diagrams and examples illustrate its use.

Miscellaneous Publications

9183 The Measurement of Thermal Conductivity of Refractory Materials. F. H. Norton and W. D. Kingery. U. S. Atomic Energy Commission, NYO-601, Jan. 1, 1952, 52 pages. (UF767 U3ny)

Additional measurements of thermal conductivity of thorium oxide, zirconium oxide, and an electrical porcelain for temperatures up to 1300°C. are reported. A comparative method and equipment for measuring thermal conductivity of ceramic materials is reported. Thermal conductivity of Al_2O_3 was determined at temperatures up to 1750°C. by an ellipsodial test method employing induction heating. Theory of power measurement for induction heating and literature regarding porosity are reviewed. 53 ref.

See also:

8371 (wollatonite as ceramic raw material)
8434 (casting metal–ceramic materials)
8525 (metal-ceramic brazing)
8942 (wear of ceramics in telephone switching apparatus)
8952 (measuring thermal conductivity of insulating materials)
9641 (colloid-chemical properties of clays)
9719 (electrical properties of ferrites)
9793 (ceramic transformer insulation)

23. LUBRICATION AND FRICTION

9184* The Alteration of Mineral Oils in Steam Engines. (In French.) Alfred Maillard and Jean Teitgen. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences,* v. 234, Apr. 16, 1952, p. 1625-1627.

Presents observations on above behavior during service. Table gives compositions of new and used oil and of three fractions of the solid material deposited on the engine parts.

9185* Aeration and Foaming in Lubricating Oil Systems. R. Tourret and Norman White. *Aircraft Engineering,* v. 24, May 1952, p. 122-130, 137.

A study of oil aeration and the fundamentals of the foaming process, with particular reference to aircraft engines. Numerous graphs and diagrams. 38 ref.

9186 Tapered-Hole Disk Penetrometer for Determining Consistency of Semifluid Greases. D. H. Birdsall and B. W. Hotten. *Analytical Chemistry,* v. 24, May 1952, p. 892-894.

Discusses various present methods. Describes and diagrams above apparatus; presents and discusses typical results.

9187* "Dopes and Additives" (A Bibliography). (Concluded.) A. Zwergal and H. Umstätter. *Erdöl und Kohle,* v. 5, Apr. 1952, p. 237-240.

Discusses heavy-duty and high-pressure additives, crystallization inhibitors, viscosity-index improvers, and rheologically effective additives for lubricants. 48 ref.

9188* Methods for Expressing the Viscosity-Temperature Relationship of Lubricating Oils. J. F. T. Blott and C. G. Verver. *Journal of the Institute of Petroleum,* v. 38, Apr. 1952, p. 193-226; disc., p. 226-249.

Reviews systems and indices proposed in the past for expressing the above by a single figure. Postulates a modification of the present viscosity-index system, which retains the essential features of the original Dean and Davis scheme while eliminating its shortcomings.

9189* Some Views on the SAE Viscosity Classification. J. G. Withers. *Journal of the Institute of Petroleum,* v. 38, Apr. 1952, p. 250-256.

Suggests minor modifications of the SAE viscosity classification for automotive lubricating oils. Makes general recommendations for viscosity grades appropriate to different atmospheric temperatures. Numerous tables.

9190* Maintenance Lubrication of Ball and Roller Bearings. R. L. Wheeler. *Institute Spokesman,* v. 16, May 1952, p. 20-32.

Confined primarily to the lubrication of the conventional types of ball and roller bearings in the field. Not intended to cover the lubrication of prepacked or so-called life-time lubricated bearings. Short discussion on cleaning antifriction bearings, followed by a brief outline as to the cause and prevention of bearing failures.

9191* Grease Lubrication of Ball Bearings. Leland D. Cobb. *Lubricating Engineering,* v. 8, June 1952, p. 120-124.

Limited to grease-lubricated, integrally sealed bearings and to how commercially available grease works in ball bearings, and not how to build better greases. Discusses and describes bearing-test equipment and procedures; grease volume vs. bearing life; mechanics of grease lubrication; and positioning of grease with respect to bearing surfaces.

9192* Lubricant Classification. C. A. Bailey. *Lubrication Engineering,* v. 8, June 1952, p. 125-127; disc., p. 127-128.

Discusses methods for the above, and describes system used at National Tube Div., U. S. Steel Corp., Pittsburgh.

9193* Application of Infra-Red Spectroscopy to Lubrication Engineering. George Rappaport. *Lubrication Engineering*, v. 8, June 1952, p. 129-131, 134.

Describes use of above at Materials Lab, Wright Air Devel. Center, Dayton, Ohio. Spectra are placed on special punched cards to facilitate quick sorting out of desired information.

9194* Application of Oil Lubricants to Plain Bearings. Lee Ballard. *Machinery* (American), v. 58, June 1952, p. 163-166.

First of 3 articles describing some of the principles involved in lubricating plain and antifriction bearings.

9195 Aircraft Gas-Turbine Bearing Lubrication. *Mechanical Engineering*, v. 74, June 1952, p. 512-514.

Discussion, including author's reply, of paper of similar title by E. M. Phillips (Dec. 1951 issue). Table and graphs.

9196 A Discussion on Friction. *Proceedings of the Royal Society*, ser. A, v. 212, May 22, 1952, p. 439-520.

Includes introduction by F. P. Bowden, plus 8 papers on friction of metals, 4 on friction of nonmetals, and 5 on boundary and e.p. lubrication, plus accompanying discussion. Selected papers are individually abstracted.

9197 Mechanism of Boundary Lubrication. D. Tabor. *Proceedings of the Royal Society*, ser. A, v. 212, May 22, 1952, p. 498-505; disc., p. 516.

Shows how the theory of metallic friction is modified in the presence of boundary films. Minute metallic junctions contribute to the frictional resistance and play a major part in wear of lubricated surfaces. Effect of temperature shows that the most effective lubrication is provided by a solid boundary film which possesses a close-packed strongly oriented structure. A recent study of metal transference from one surface to the other as sliding takes place, using radioactive metals, shows that, at the melting-point of the lubricant film, a marked increase in pickup and friction occurs. At still higher temperatures, a second deterioration in lubricating properties occurs, corresponding to desorption of the lubricant film.

9198 Mechanism of Action of Extreme Pressure Lubricants. C. G. Williams. *Proceedings of the Royal Society*, ser. A, v. 212, May 22, 1952, p. 512-515.

Discusses the above, indicating variations among different metals, as well as among different e.p. lubricants.

9199 Variation with Load of the Coefficient of Friction and Metallic Transfer Under Conditions of Boundary Lubrication. W. Hirst, M. Kerridge, and J. K. Lancaster. *Proceedings of the Royal Society*, ser. A, v. 212, May 22, 1952, p. 516-520.

Several papers have been published recently which show for a number of metals that, under certain experimental conditions, several molecular layers of boundary lubricant are necessary to give effective lubrication. Recent experiments by the authors suggest that these results represent parts of a more general pattern. Graphs, macrographs, micrographs, and 82 ref.

See also:
8777 (friction and lubrication of metals)
9354 (solubility of gases in lubricants)

24. DESIGN

9200* The Theory and Design of Long-Deflection Constant-Force Spring Elements. F. A. Votta, Jr. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 439-447; disc., p. 447-450.

A thorough study of the "Neg'ator," its present and predictable applications and design procedures. The Neg'ator is characterized by properties which permit it to exert constant or controlled varying force through theoretically infinite deflection. Design formulas and operation of the three major forms. Major existing applications are examined in terms of form, function, field, and type of mechanism.

9201* Cavitation Mechanics in the Design of Hydraulic Equipment. Robert T. Knapp. *Engineer*, v. 193, Apr. 25, 1952, p. 571-574; May 2, 1952, p. 592-596; May 9, 1952, p. 627-628.

Outlines various characteristics of the cavitation phenomenon and points out, in general, how this knowledge may be used to alleviate and, in some case, to eliminate the losses due to damage of materials and decrease in performance of hydraulic equipment. Graphs and photographs.

9202* Design of Nozzles Having Continuous Wall Curvature. J. C. Crown. *Journal of the Aeronautical Sciences*, v. 19, May 1952, p. 358-359.

Mathematics of the above, for use in supersonic wind tunnels.

9203* The Stability of Plane Bending Below the Elastic Limit. III. Influence of Complex Loading. (In Russian.) L. M. Kachanov. *Prikladnaia Matematika i Mekhanika*, v. 15, Nov.-Dec. 1951, p. 762-764.

A mathematical treatment.

9204 Radii of Curvature in Slider-Crank Mechanisms. Jesse Huckert. *Product Engineering*, v. 23, June 1952, p. 126-133.

Semi-graphical method for determining radii of curvature of the locus traced by any part in any link of a slider-crank mechanism, including inversions. Charts of angular magnitudes for slider-crank mechanisms of several ratios. Detailed steps in applying the method are demonstrated.

9205 Isolating the Noise and Vibration of Rotating Machines. Harry Himelblau, Jr., and Fred Schloss. *Product Engineering*, v. 23, June 1952, p. 151-154.

Development and application of equations for above design problems.

9206 Streamlining the Selection of Rectangular Wire Helical Springs. Alex Yorgiadis. *Product Engineering*, v. 23, June 1952, p. 155-157.

Stress and deflection nomograms facilitate above.

9207 Thirteen Ways to Use Metallic Bellows. E. Perry Cumming. *Product Engineering*, v. 23, June 1952, p. 162-163.

Sketches illustrate unique as well as typical applications and show how the movement of the bellows can be transferred to other elements.

9208 Stress Charts for Pressurized Elliptical and Oblong Tubes. J. C. Weydert. *Product Engineering*, v. 23, June 1952, p. 195, 197, 199.

Includes numerical examples.

9209 Press Tools for the Tin-Box Industry. G. Taylor. *Sheet Metal Industries*, v. 29, June 1952, p. 503-508.

Designs of above are described and diagrammed. (To be continued.)

9210* The Coil Spring, A New Type of Machine Element. (In German.) Heinrich Blaise. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, Mar. 21, 1952, p. 253-258.

Describes various possibilities for the above. Numerous schematic diagrams.

Miscellaneous Publications

9211 A Summary of Diagonal Tension. Part I. Methods of Analysis. Part II. Experimental Evidence. Paul Kuhn, James P. Peterson, and L. Ross Levin. National Advisory Committee for Aeronautics, Technical Notes 2661 and 2662, May 1952, 131 and 81 pages. (TL570 Un3t)

Books

9212* Data Book for Civil Engineers: Specifications and Costs. Ed. 2. Elwyn E. Seelye. 505 pages. 1951. John Wiley and Sons, New York. (TA151 Se35d2)

Provides data necessary to prepare specifications for airports, roads, railroads, bridges, dams, docks, drainage, and sewers. It includes relative cost analyses for each type of work, and a classified glossary of terms.

See also:
8571 (tool and die design)
9118 (design of gas-turbine engine)
9709 (design of aircraft electronic equipment)

25. CHEMICAL TECHNOLOGY

9213 The Mercerisation of Cellulose. I. A Thermodynamic Discussion. II. A Phase Transition Study With X-Ray Diffraction. III. A Phase Transition Study Using Electric Diffraction. (In English.) Bengt G. Ranby. *Acta Chemica* Scandinavica, v. 6, no. 1, 1952, p. 101-138.

87 references.

9214* Chemical Transformation of Cellulose Macromolecules Under the Influence of Oxidizers. (In Russian.) **Report 4. Lactone-Type Bonds in Oxycellulose Macromolecules and Their Influence on Detection of Carbonyl Groups by Condensation With Hydroxylamines.** E. D. Kaverzneva and A. S. Salova. **Report 5. Proof of the Existence of α-Oxymonoketone Groups in Oxycellulose.** E. D. Kaverzneva. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, Nov.-Dec. 1951, p. 782-794.

9215* Calculation of Temperature Differences in Evaporating and Drying Equipment Operating on the Spray Principle. (In Russian.) L. I. Kurdinshev. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1812-1824.

A mathematical analysis.

9216* Advances in Theoretical and Practical Studies of Gas Fading. V. S. Salvin, W. D. Paist, and W. J. Myles. *American Dyestuff Reporter*, v. 41, May 12, 1952, p. P297-P302.

Describes above phenomenon and discusses the mechanism of the reaction in relation to the nature of the fabric, as well as use of newer dyes and inhibitors. Data are presented on absorption of NO_2 by cotton and nylon. Acetyl value of the fiber, as well as its moisture content, has a marked effect on rate of gas fading. It was found that rate of gas fading can be correlated with dye structure. The nature of chemical changes in dyestuffs and advances in the synthesis of resistant dye structures are discussed. Application and effectiveness of permanent and fugitive inhibitors is reviewed, and an attempt made to correlate inhibitor structures and properties. 121 ref.

9217* Tanning With Polyhydric Phenols and Aldehydes. Wallace Windus. *Journal of the American Leather Chemists Association*, v. 47, Feb. 1952, p. 87-97.

Describes a new synthetic tannage process involving formation of tanning agent in the presence of skin or hide. Discusses practical aspect of tanning with resorcinol and formaldehyde. Postulates mechanism of tanning based upon the Mannich reaction. 14 ref.

9218* A Method for Predicting Dye Penetration on Leather. W. K. Schweitzer, Jr., and R. M. Lollar. *Journal of the American Leather Chemists Association*, v. 47, Mar. 1952, p. 140-151.

Describes above for acid, basic, and direct rays. Gives standard laboratory method for dyeing chrome-tanned calfskin. Tables. 11 ref.

9219* Physico-Chemical Studies of Extremely Basic Chromic Chlorides. K. H. Gustavson. *Journal of the American Leather Chemists Association*, v. 47, Mar. 1952, p. 151-165.

A study using, in part, sulfonic acid-type cation exchangers, and free and paper-electrophoresis. Gives information on complexes found in the solutions and interaction of solutions of basic chloride with collagen. Tables and photographs. 27 ref.

9220* Use of Polysulfide Liquid Polymers for Impregnation of Leather. K. R. Cranker and J. S. Jorczak. *Journal of the American Leather Chemists Association*, v. 47, Mar. 1952, p. 178-188; disc., 188-191.

A simple and useful way of filling leather with liquid synthetic rubber has been developed. Practical applications to leather mechanical goods, such as oil seals, are described. Tables and graphs.

9221* Studies in Chrome Tanning. XVIII. The Use of Naphthalenic Syntans As Adjuncts in Chrome Tanning. Edwin R. Theis and W. R. Lotz. *Journal of the American Leather Chemists Association*, v. 47, Apr. 1952, p. 219-269.

A comprehensive investigation on the above. Covers their use in the pickle, in the chrome liquor, and as setting agents during chrome tanning. Tests were made by the drum bate-pickle-and-tan procedure. Numerous tables and graphs.

9222* Recent Findings on Tanning Properties of Lignosulfonates. Martin Baum, Robert Lovin, and J. Richter Salvesen. *Journal of the American Leather Chemists Association*, v. 47, Apr. 1952, p. 269-278; disc., p. 278-280.

9223* Lubricating Properties of Mineral Oils When Used As Replacement For Fatty Oils in Fatliquoring. Robert W. Koppenhoefer. *Journal of the American Leather Chemists Association*, v. 47, Apr. 1952, p. 280-290.

9224* A Look Into the Colloidal System of Mineral Oil Tar. (In German.) H. Mallison. *Brennstoff-Chemie*, v. 33, May 14, 1952, p. 172-176.

Tables, graphs, and photomicrographs supplement this general discussion on the components of tar as a colloidal system.

9225 Oxidation of Petroleum Residues. W. Graham, W. J. G. Cudmore, and R. D. Heyding. *Canadian Journal of Technology*, v. 30, June 1952, p. 143-152.

Oxidation of a steam-reduced crude and a cracked petroleum residue by air and oxygen blowing at 200°C. was investigated. Change in the quantities of oils, resins, and asphaltenes with oxidation was determined, as well as oxygen content of these fractions. Relative rates of formation of the asphalt fractions are discussed. Diagrams and tables.

9226 Benzene From Petroleum—At What Price? Roger Williams, Jr. *Chemical Engineering*, v. 59, May 1952, p. 157, 378.

To make Williams and Southerland's analysis more readily understandable to chemical engineers, the author has converted their figures to the accounting methods normally used by one of the large chemical companies.

9227 Platforming & Udex. *Chemical Engineering*, v. 59, May 1952, p. 242-245.

"Pictured flowsheet" of Eastern States Petroleum's Platformer-Udex combination for production of aromatics from petroleum at its Houston, Tex., refinery. Main advantages of the combination is that, with only minor adjustments, it can be modified to produce mixed xylenes, ethyl benzene, paint solvents, edible oil solvents, and motor fuels in addition to benzene and toluene.

9228 New Cell Renews Spent Caustic. *Chemical Engineering*, v. 59, May 1952, p. 254, 256-258.

Electrolytic cell regenerates large volumes of caustic soda used to sweeten sour gasoline. Commercial unit handles 1700 Bpd. caustic, saving $80,000 a year on utilities and tetraethyl lead. Diagrams and illustrations.

9229 New Units Deionize Glycerine. *Chemical Engineering*, v. 59, May 1952, p. 260, 262, 264-265.

Describes 3 new plants for the above. The process works equally well on different kinds of crude.

9230 Clinical Status of Plasma Substitutes. Edwin J. Pulaski. *Chemical Engineering News*, v. 30, May 26, 1952, p. 2187-2189.

Discusses utility of dextran, PVP, gelatin, and other products as blood-plasma substitutes.

9231 Gaseous Fluidization of Solid Particles. Robert D. Toomey and H. F. Johnstone. *Chemical Engineering Progress* (Engineering Section), v. 48, May 1952, p. 220-226; disc., p. 226.

A theory of fluidization is developed based on forces and energy transformations within the fluidized system. Analysis of the energy transformations results in a general equation relating pressure drop to superficial gas velocity and particle diameter. Gas flow at higher velocities, can be estimated. Differential pressure losses through fluidized beds of spherical beads and velocities of the particles along the wall were measured. 17 ref.

9232 Pressure Loss in Centrifugal Entrainment Separators Under Vacuum. E. A. Lawrence. *Chemical Engineering Progress* (Engineering Section), v. 48, May 1952, p. 241-246; disc., p. 246.

Results of experimental study for fatty-acid vapor, water, and

glycerine vapors at 100-200 ft./sec. in units ranging from 1-in. to 20 in. inlet diam. Pressure losses on 16- and 20-in. units in use on factory glycerine evaporators and glycerine stills are included. Diagrams and tables.

9233* Extraction and Utilization of Methane From Collieries. (A condensation.) D. W. Gillings. *Chemical & Process Engineering*, v. 33, May 1952, p. 259-261.

Extraction of methane or firedamp from coal mines is both an important safety measure and a means of obtaining a valuable raw material suitable for use as a fuel or as a basic chemical. Describes British developments in extracting and utilizing methane.

9234* Mechanical Vibration in Processing Technique. (In German.) Rudolf Auerbach. *Chemie-Ingenieur-Technik*, v. 24, May 1952, p. 259-261.

Brief description and illustration of different types of frequency generators is followed by discussion of industrial uses of low-frequency vibrations. Diagrams and graphs. 11 ref.

9235 Glass Plant in Industry and Research. *Chemistry & Industry*, Mar. 29, 1952, p. 287-290.

A report of a discussion meeting of the Society of Chemical Industry directed at the problem of heating, cooling, and stirring the contents of large glass reaction vessels in batch processes.

9236 The Effect of Sodium Bicarbonate on the Combustion of Cellulosic Materials. J. E. Dolan. *Chemistry & Industry*, Apr. 26, 1952, p. 368-371.

Pyrolyses of various sodium bicarbonate-treated celluloses were carried out using a hardwood pulp with an alpha-cellulose content of 90-91%, and a moisture content of 7%. Apparatus diagrams, graphs, and tables.

9237 The Diamino-Triazine Group: Some Recent Approaches and Applications. G. V. Austerweil. *Chemistry & Industry*, Apr. 26, 1952, p. 372-375.

Shows possibility of various applications which may be developed industrially through a simple and relatively cheap method of production.

9238* Chemical Engineering at the Cross-Roads. Harold Hartley. *Engineer*, v. 193, May 2, 1952, p. 614-615.

A review of present work, and a survey of future aspects.

9239* Origin of the Hydrocarbons in Low Temperature Tars. M. Vahrman. *Fuel*, v. 31, Apr. 1952, p. 171-175.

Work described was carried out on perhydrous coals and lignites in the hope of increasing the yield of commercially valuable chemical products as compared with the yields obtained by either carbonization or solvent extraction alone. Main object was to extract the waxes and resins, first to obtain a product of the montan wax type, and then to carbonize the residue from this extraction for maximum yield of primary tar.

9240 New Catalytic Desulphurisation Process. *Industrial Chemist and Chemical Manufacturer*, v. 28, May 1952, p. 216.

Process developed by Anglo-Iranian Oil Co. and employed in their refinery at Llandarcy in South Wales. Tabular data.

9241 200 Years of Nickel Progress; Catalysts. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 977-1014.

Includes "Catalytic Activity of Nickel. Theoretical Aspects", D. A. Dowden; "Nickel Compounds as Catalyst Raw Materials", John G. Dean; "Nickel Catalysts in Hydrogenation of Fats and Oils", A. E. Bailey; "Nickel Catalysts in Acetylene and Carbon Monoxide Chemistry", Clyde McKinley; "Nickel Catalysts for Hydrocarbon-Steam Reaction", M. R. Arnold, Kenton Atwood, H. M. Baugh, and H. D. Smyser; "Raney Nickel-Catalyzed Hydrogenation of Commercial Aldol", C. Kinney Hancock; "Catalytic Activity of Nickel Borides", Raymond Paul, Paul Buisson, and Nicole Joseph; and "Catalytic Oxidation of Sulfur Compounds in Coal Gas", Roland H. Griffith. Each paper is followed by a series of references and includes graphs, tables, etc.

9242 Citrate-Insoluble Residue From An Ammoniated Superphosphate; X-Ray Diffraction Study. W. J. Hecht, Jr., E. A. Worthington, and E. D. Crittenden. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1119-1123.

Numerous graphs and tables.

9243 Composition of Naphtha From Fluid Catalytic Cracking. F. W. Melpolder, R. A. Brown, W. S. Young, and C. E. Headington. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1142-1146.

The sample analyzed was the total naphtha from a fluid catalytic cracking unit operating at 900°F. on synthetic silica-alumina catalyst and a gas-oil charge stock from a mixed crude source. Extensive tabular data.

9244 Selection of Surface Active Agents For Detergent Applications; Suspending Power and Micellar Solubilization. A. M. Mankowich. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1151-1159.

Describes development of improved system for study of the above. Results of application to a large number of materials are tabulated. 26 ref.

9245* A Solvent Method For the Recovery of Tar Binder From Road Materials. E. H. Green. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 192-198.

9246* Comparison of Hot-Centrifuge and Solvent Methods for the Recovery of the Tar Binder From Road Materials. C. M. Gough and E. H. Green. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 198-202.

9247* Classification of Bitumens in Asphalt Technology by Certain Rheological Properties. Part II. The Conception and Derivation of Viscosity Number and Other Related New Indices. S. L. Neppe. *Journal of the Institute of Petroleum*, v. 38, Apr. 1952, p. 257-280.

9248* The Deterioration of Transformer Oil. Part II. The Influence of Transformer Constructional Materials. L. Massey. *Journal of the Institute of Petroleum*, v. 38, Apr. 1952, p. 281-297.

Describes experiments on the above, both on an accelerated basis and under conditions approximating transformer practice. Copper is shown to be especially active in this deterioration process. The role of varnish as an insulator for Cu was investigated in detail. Tables and graphs.

9249* Investigations on the System Nitrocellulose-Acetone. Arnold Münster. *Journal of Polymer Science*, v. 8, June 1952, p. 633-649.

Nitrocellulose prepared from heterogeneously degraded cotton and technical rayon pulp was divided into different fractions by adding H_2O to the acetone solution. Osmotic pressure and viscosity of each acetone solution at various concentrations were measured. 32 ref.

9250* Component Fatty Acids & Glycerides of Soybean Oil. T. A. Venkitasubramanian. *Journal of Scientific & Industrial Research*, v. 11B, Apr. 1952, p. 132-134.

Soybean oil was examined by Bertram's oxidation method and Kaufmann's thiocyanogen method for component fatty acids and was found to contain 11.1% palmitic, 3.2% stearic, 29.8% oleic, 52.1% linoleic, and 3.73% linolenic acids. 20 ref.

9251* Ion Exchangers: Part I. Sulphonation of Indian Coal. S. L. Bafna, M. U. Pai and H. A. Shah. *Journal of Scientific & Industrial Research*, v. 11B, Apr. 1952, p. 134-136.

Cation exchangers, suitable for industrial use, have been prepared by sulfonating semi-bituminous coal. Conditions for obtaining a product comparable with commercial carbonaceous exchangers in exchange capacity were worked out.

9252* New Trends in Fat Liquoring. Felix F. Axelrad. *Leather and Shoes*, v. 123, May 31, 1952, p. 8, 31-32.

An analysis, with a discussion of applications, of above process for shoe upper leather.

9253 Commercial Burner Oil Specifications. J. Verne Resek. *Mechanical Engineering*, v. 74, June 1952, p. 475-479.

Discusses value of current standards and makes suggestions for further revisions. Table and graphs.

25. *Chemical Technology*

9254* Electrolytic Regeneration of Treating Solutions Provides Low-Cost Removal of Sulfur Compounds From Motor Fuels. Oliver J. Zandona and Charles W. Rippie. *Oil and Gas Journal*, v. 51, June 2, 1952, p. 80, 82-84.

Describes "ADC" process developed by American Development Corp. in cooperation with Ashland Oil & Refining Co. Includes flowsheet, tables, and graphs.

9255* New Plant at Doe Run, Ky., Producing Petrochemicals From Ethane and Propane. J. J. Hogan. *Oil and Gas Journal*, v. 51, June 9, 1952, p. 86, 88.

Mathieson Chemical Corp. plant is in operation producing ethylene glycol. These additional materials are also produced in commercial quantities: ethylene oxide, ethylene dichloride, and other chlorinated hydrocarbons, plus liquefied petroleum gas and natural gasoline.

9256 Recovery of Sulfur Dioxide From Dilute Gases. H. F. Johnstone. *Paper Trade Journal*, v. 134, May 23, 1952, p. 24, 26, 30, 32, 36, 39.

Possibilities of above are reviewed from the standpoint of providing an additional source of the gas for use in pulp mills. Recovery by ammonium sulfite-bisulfite solutions, and by lime or limestone slurry, are considered. Graphs and flow diagrams. 12 ref.

9257* Integrated Phenol Recovery For Low-Temperature Carbonisation Plants. W. Lowenstein-Lom. *Petroleum*, v. 15, May 1952, p. 154-156, 160.

Indicates that recovery of phenol from the above is an economic proposition, particularly where low-grade coals with high yields of tar acids are being treated. An integrated phenol-recovery system for this purpose is described and diagrammed.

9258 Thermofor Catalytic Reforming (TCR). J. W. Payne, L. P. Evans, E. V. Bergstrom, and V. O. Bowles. *Petroleum Engineer*, v. 24, June 1952, p. C10, C13-C18, C20.

Describes development of above process which provides a modern, economical method of up-grading low-octane-number, straight-run and thermal gasoline stocks into premium fuels in the F-1 octane-number range of 100. Uses a chromia-alumina gel in a regenerative moving-bed type process. Flow diagrams and tables.

9259 Houdriforming—Its Place in the Refining of Petroleum. T. A. Burtis and H. D. Noll. *Petroleum Engineer*, v. 24, June 1952, p. C39-C40, C42-C44.

Presents a yield and economic study, considering various methods for processing 10,000 barrels per calendar day of East Texas crude with production of gasoline and other products. Principal variable involved is reforming. Tables and graphs.

9260 Dehydration on Products Pipe Line. R. P. Dougherty. *Petroleum Engineer*, v. 24, June 1952, p. D10, D12, D14, D16, D18, D20.

Describes natural-gas regeneration dehydrator installed by Wyco Pipe Line Co. as protection against internal corrosion. Discusses operation and operating costs. Photographs and charts.

9261 Cooling Water Treatment With Surface Active Materials. W. F. Oxford, Jr. *Petroleum Processing*, v. 7, May 1952, p. 620-622.

Reports experiences encountered in use of surface-active agents in preventing scale and corrosion in the circulating cooling-tower water of gas compressor plants. Includes weight-loss curves on soft-iron test strips. Tables and photographs.

9262 The New "Benturi" Fractionator Tray. D. P. Thornton, Jr. *Petroleum Processing*, v. 7, May 1952, p. 623-627.

Describes above giving mechanism of action, performance figures, and design information for the user. Tables, photographs, and chart.

9263 Progress in Petrochemicals. Max Neuhaus and Nolan B. Sommer. *Petroleum Processing*, v. 7, May 1952, p. 641-646.

A survey of this industry covering size; companies, their locations and scopes of operations; and products, origin, and place in the economy. 19 ref.

9264 Shell Process Permits Recovery of Nitration-Grade Benzene and Toluene. C. L. Dunn and G. E. Liedholm. *Petroleum Refiner*, v. 31, May 1952, p. 104-108.

Tables, graphs, and diagrams.

9265 The Arosorb Process in Refinery Operations. W. H. Davis, J. I. Harper, and E. R. Weatherly. *Petroleum Refiner*, v. 31, May 1952, p. 109-113.

Describes the Arosorb process, a Sun Oil Co. development which is an outgrowth of the use of silica gel as an analytical method for separating various types of hydrocarbon liquids.

9266 Destrehan Fluid Hydroformer Scheduled For Operation Soon. J. E. Seebold, J. W. Bertetti, J. F. Snuggs, and J. A. Bock. *Petroleum Refiner*, v. 31, May 1952, p. 114-116.

Describes fluid hydroformer which is the first commercial hydroforming unit to use the fluidized-catalyst technique. It will process Gulf Coast naphtha to produce either aviation or motor-gasoline hydroformate.

9267 Acetylene—The Newest Petrochemical. R. S. Aries and R. M. Cziner. *Petroleum Refiner*, v. 31, May 1952, p. 127-132.

General discussion of the industry development—processes and chemicals.

9268 Producing 90-Octane Gasoline With Houdriflow. Fred B. Boynton. *Petroleum Refiner*, v. 31, May 1952, p. 133-135.

Complete performance data on a Houdriflow unit are tabulated in this article on the catalytic cracking unit at Drumright, Okla., operated by Tide Water Associated Oil Co. In addition to a discussion of process flow, operating hints are outlined from the first year's experience with this unit.

9269 Panoma Plant Favors Intermediate Separation Over Consecutive Topping. I. Earl Nutter. *Petroleum Refiner*, v. 31, May 1952, p. 146-150.

An economic study of two sequences of fractionation reveals that the method of separating groups of products and then separating the binary mixtures is preferable to the method of consecutively removing the products in order of their volatility.

9270 Extractive Crystallization—A New Separation Process. Part II. Thermodynamic Considerations. Kenneth A. Kobe and William G. Domask. *Petroleum Refiner*, v. 31, May 1952, p. 151-157.

Concerned primarily with the thermodynamics involved in adduct formation. Includes consideration of certain physical properties and a brief discussion of thiourea adducts.

9271 Shale Oil Production and Refining Today. Part III. Peter W. Sherwood. *Petroleum Refiner*, v. 31, May 1952, p. 160-164.

Discusses refining operations for converting the recovered shale oil into gasoline or diesel oil. As the key to the entire future of the shale oil industry, the economic questions on gasoline production from shale oil are discussed.

9272* Research on the Constitution of Natural Asphalts. (In Italian.) E. Mariani. *Rivista dei Combustibili*, Mar. 1952, p. 164-178.

Natural asphalts were reacted with halogens giving both addition and substitution products. Effects of various factors (nature of the asphalt, temperature, time, concentration, and form of the halogen) on these two types of reaction were studied. An attempt was made to determine quantity and nature of the asphaltenes, oils, and resins obtained from one asphalt extracted with various solvents. Results obtained by extraction of asphalt with liquid SO_2 are reported. A systematic study was started on products obtained by reaction with oxidizing agents such as alkaline $KMnO_4$ and HNO_3. Methods for separation of the oxidation products and effects of various factors were studied. A method for determination of free S in natural asphalt is reported.

9273* Thermodynamics of Lime Manufacture. Part V. Ralph Gibbs. *Rock Products*, v. 55, May 1952, p. 92-94.

Covers factors to be considered in design of lime kilns for best over-all economy. Graphs and tables.

9274* Fiber Orientation in Paper (Zero-Span Tensile Strength); Tappi Suggested Method T 481 sm-52. *Tappi*, v. 35, May 1952, p. 180A-183A.

9275* Ink-Erasing Quality of Paper; Revision of Tappi Suggested Method T 478 sm-50. *Tappi*, v. 35, May 1952, p. 183A-184A.

9276* Pilot Plant Recovery of Heat and Sulphur From Spent Ammonia-Base Sulphite Pulping Liquor. G. V. Palmrose and J. H. Hull. *Tappi*, v. 35, May 1952, p. 193-198.

Operation of a pilot plant at the Lebanon, Ore., mill of Crown Zellerbach Corp. for studying evaporation and burning of ammonia-base spent liquor with recovery of sulfur from the resultant flue gases has demonstrated practicability of the process. Design of a full-scale plant is discussed.

9277* Problems in Testing Wet-Strength Paper. C. S. Maxwell. *Tappi*, v. 35, May 1952, p. 220-223.

Problems of testing, reporting, and interpreting the results are discussed. Problems of correlating off-machine, natural, and accelerated aging data are also considered. Tables and graphs.

9278* Partial Acetylation of Cotton. Albert S. Cooper, Samuel T. Voorhies, Jr., Edmund M. Burns, Jr., and Charles F. Goldthwait. *Textile Industries*, v. 116, Jan. 1952, p. 97-102, 194-195.

Describes general process; acetylation of raw stock, yarn, and cloth by batch methods on standard mill equipment; and a dye test for extent and quality of treatment. Tables and photographs.

Books

9279 The Essential Oils. Vol. Six. Individual Essential Oils of the Plant Families Ericaceae, Betulaceae, Valerianaceae, Verbenaceae, Cistaceae, Cruciferae, Liliaceae, Iridaceae, Araceae, Palmae, Cyperaceae, Moraceae, Aristolochiaceae, Chenopodiaceae, Ranunculaceae, Euphorbiaceae, Malvaceae, Usneaceae, Podocarpaceae, Pinaceae, Taxodiaceae, and Cupressaceae. Ernest Guenther. 481 pages. 1952. D. Van Nostrand Co., New York. (TP680 G93e)

Completes the series. Like preceding volumes, it is composed of monographs describing individual oils. A large section is devoted to pine oils.

9280 Absorption and Extraction. Ed. 2. Thomas K. Sherwood and Robert L. Pigford. 478 pages. 1952. McGraw-Hill, New York. (TP156.A3 Sh58a2)

The earlier edition (1937) has been very largely revised, so that little of the original material has been retained in its earlier form. Emphasizes developments in the theory of mass transfer from a surface to a turbulent fluid stream, and in relationships between fluid friction, heat transfer, and mass transfer. Much other new information and many refinements of design methods are incorporated. Problems and 518 ref.

9281 Unit Processes in Organic Synthesis. Ed. 4. P. H. Groggins, editor. 937 pages. 1952. McGraw-Hill, New York. (QD262 G89u4)

Prime objective continues to be presentation of the industrial methods used in converting organic raw materials into usable products by means of unit processes. Underlying principles and factors for each unit process are organized in a systematic manner with most emphasis on fundamental principles. Detailed discussion of manufacturing processes is included only to the extent required for elucidation of basic principles. Intended as a "semi-works course" to facilitate transition from the university classroom to an industrial environment. Chapters are by different authors. Footnote refs.

9282 Index des Huiles Sulfonées et Détergents Modernes. (Index of Sulfonated Oils and Modern Detergents.) P. P. Sisley. 549 pages. 1949. Éditions Teintex, Paris. (TP990 Si83i)

Introduction and abbreviations are followed by chapters on fields of application, and on properties. The system of classification is then described with extensive textual information on chemistry and on applications in various industries. This is followed by indexes of trade names, arranged alphabetically and by types.

See also:
8778 (Al and alloys in chemical industry)
8788 (Ni alloys in chemical industry)
8946 (chemical process instrumentation)
8998 (electronic control in paper industry)
9027 (minimizing air pollution in chemistry industry)
9129 (Transactions of World Power Conference)
9720 (transistors in chemical engineering)
9723 (SF_6 as gaseous transformer insulation)

26. CHEMISTRY—GENERAL, INORGANIC, AND PHYSICAL

9283* Experimental Apparatus for Studying the Discharge of Electrolytic Anions by Gaseous Ions. (In French.) Charles Eyraud and Pierre Gilly. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 7, 1952, p. 1553-1555.

Describes above apparatus which makes it possible to use as and anode an ionized pure gas having an equipotential gas-liquid interface. The discharge of positive ions is maintained in a current of O_2, H_2, or N_2 under reduced pressure. The electrolyte is a solution of 38% H_2SO_4, maintained at −68°C. Diagrams.

9284* Discharge of Electrolytic Anions by Gaseous Ions. (In French.) Charles Eyraud and Pierre Gilly. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 16, 1952, p. 1614-1616.

Compares results of passage of a definite amount of electricity of very low intensity, in the apparatus described by the authors in the preceding issue; also after replacing the gaseous electrode with a Pt anode.

9285* The Determination of Limits of Existence and of Solubility Product of Monobasic Lead Chromate. (In French.) Berthe Charreton. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 16, 1952, p. 1623-1625.

Includes graph.

9286* Anomalies in the Diffusion Spectra of Piezoelectric Crystals. I. Evidence of Longitudinal and Transverse Waves in Cubic Crystals. (In French.) Lucienne Couture-Mathieu, Henry Poulet, and Jean-Paul Mathieu. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 28, 1952, p. 1761-1763.

Discusses above phenomena and presents experimental results for $NaClO_3$.

9287* The Phosphates of Aluminum. (In French.) Henri Guérin and René Martin. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 28, 1952, p. 1777-1779.

Shows the existence of various aluminum phosphates by the establishment of the equilibrium diagram of the P_2O_5-Al_2O_3-H_2O system at 60°C., and examines the action of heat on the various corresponding anhydrous salts.

9288* Ionization Phenomena Accompanying the Rupture of Liquid Surfaces. (In French.) Paulette Pannetier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1881-1883.

Describes the behavior of the ions of liquid electrolytes upon rupture of their surfaces. Principles upon which the experiments were based are described; results are charted.

9289* A Method for Studying the Ionic Conductivity of Certain Salts at Room Temperature. (In French.) Marcel Perrot and Abdelhak Sator. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1883-1885.

Describes experimental technique applied to $PbCl_2$ at room temperature and in a vacuum. Results are discussed, charted, and illustrated by micrographs.

9290* Certain Catalytic Properties Exhibited by Montmorillonite. (In French.) Fernand Kayser and Jean-Michel Bloch. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1885-1887.

Describes experiments on the above. Action of basic or acid montmorillonite in the synthesis of dyestuffs is indicated.

26. *Chemistry—General, Inorganic, and Physical*

9291* The Crystal and Molecular Structure of Pentaborane. (In English.) William J. Dulmage and William N. Lipscomb. *Acta Crystallographica*, v. 5, Mar. 1952, p. 260-264. 14 references.

9292* Elastic Liquids. (In German.) E. G. Richardson. *Acta Physica Austriaca*, v. 5, no. 3, 1952, p. 390-397.

Experiments demonstrate the elasticity of liquids as distinguished from viscosity. The practical importance of the elasticity concept of liquids is briefly discussed. Diagrams, graphs, and photographs.

9293* The Scattering of X-Rays Through Small Angles and the Porous Structure of Activated Carbon. (In Russian.) V. I. Danilov and A. S. Serikov. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 71-74.

Theoretical analysis plus experimental data.

9294* Electron-Microscopic Investigation of Cokes Formed on Aluminosilicate Catalysts During Cracking of Hydrocarbons. (In Russian.) B. V. Klimenok and A. B. Shekhter. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 109-110.

Illustrated.

9295* The Deposition of Hydrogen on Iron Electrodes in Alkaline Solutions at High Pressures. (In Russian.) C. Levina and A. Orlov. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 115-116.

Outlines results of investigation of above, useful in connection with the Fe-Ni battery.

9296* Equation of the Surface of Crystallization of the Inactive Compound in a Ternary System With One Binary Chemical Compound. (In Russian.) A. T. Grigor'ev. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 11, 1952, p. 231-234.

Presents a mathematical derivation of the above using entropies and chemical potentials.

9297* The Pyrophoricity of Skeletal Nickel Catalysts. (In Russian.) L. M. Kefeli and S. L. Lel'chuk. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 697-699.

A study was made on the causes of the above. Absorbed hydrogen is shown to be the important factor in the formation of NiO.

9298* Study of the Kinetics of Activated Adsorption of Oxygen and Hydrogen on Carbon With Various Amounts of Mineral Additions. (In Russian.) N. P. Keier and N. M. Man'ko. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 713-716.

The above study was made with charcoal to which had been added 1% by weight of salts of the following: K, Ca, Fe, Ni, Ag, and Pt. Some were found to increase adsorption while others reduced it. Data are charted and tabulated.

9299* The Influence of Ultra High Pressures on the Catalytic Properties of Aluminum Oxide. (In Russian.) L. F. Vereshchagin, L. Kh. Freidlin, A. M. Rubinshtein, and I. U. Numanov. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, Nov.-Dec. 1951, p. 809-818.

The behavior of Al_2O_3 catalysts under a pressure of 20,000 atm. was studied. Apparatus and method of study are described. Structural changes of the Al_2O_3 were also investigated. Data are charted.

9300 The Use of Heavy Oxygen in the Study of Reactions of Hydrogen Peroxide. Allen E. Cahill and Henry Taube. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2312-2318.

Significant information about the mechanisms by which H_2O_2 in water solution undergoes oxidation, reduction, or catalytic decomposition can be gained by a study of the path of oxygen in these reactions. Somewhat less obvious are observations on relative rates of reaction of oxidizing or reducing agents with isotopic species of H_2O_2. Relative rate of reaction of a particular substance with isotopically distinct forms of another is characteristic of the process, and has a value which varies only with temperature (or pressure). Application of the latter approach is described. Data are tabulated. 17 ref.

9301 The Kinetics of the Reaction of Thiosulfate Ion and Selenious Acid. C. H. Sorum and John O. Edwards. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2318-2322.

Kinetics and mechanism of the oxidation of thiosulfate ion by hydrogen selenite ion were investigated in the pH range from 4.2 to 6.4 by means of the change in thiosulfate concentration and pH with time. Graphs and tables.

9302 The Kinetics of the Vanadium(III)-Vanadium(IV) Exchange Reaction in Aqueous Perchloric Acid Solution. Sydney C. Furman and Clifford S. Garner. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2333-2337.

9303 Some Ion-Exchange Studies of the Polymerization of Beryllium. Isaac Feldman and Jean R. Havill. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2337-2340.

Ion-exchange between Be solutions and the ammonium form of Dowex 50 resin was studied to determine the experimental conditions under which polymerization of Be begins. At pH 5.5, Be could not be kept completely in solution, even in tracer concentration, without addition of complexing agents. 16 ref.

9304 Boron-Nitrogen Systems. I. Dimethylaminoboron Dichloride. II. Diethylaminoboron Dichloride. Robert C. Osthoff and Charles A. Brown. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2340-2345; 2378-2380.

Some physical and chemical properties of monomeric and dimeric dimethylaminoboron dichloride are reported. The monomer reacts quantitatively with trimethylamine and HCl to form one-to-one addition compounds. Some physical properties of these compounds are given. In Part II, properties of diethylaminoboron dischloride are discussed. 29 ref.

9305 The Vapor Phase Hydrolysis of Rare Earth Halides. I. Heat and Free Energy of the Reaction: $LaCl_3(S)+H_2O(g)=LaOCl(s)+2HCl(g)$. C. W. Koch, A. Broido, and B. B. Cunningham. *Journal of the American Chemical Society*, v. 74, May 5, 1952, p. 2349-2351.

9306 Reactions Between Dry Inorganic Salts. VIII. A Refractive Index Study of Solid Solutions Formed by the Reciprocal System $RbCl+KBr \rightleftarrows RbBr+KCl$. Lyman J. Wood and L. J. Breithaupt, Jr. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2355-2359.

9307 New Crystalline Phases in the System Chromium (III) Oxide-Water. A. W. Laubengayer and H. W. McCune. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2362-2364.

Above system was studied by a hydrothermal method in the range 145-560°C. The phases formed were characterized by the powder X-ray diffraction method, differential thermal analysis, and chemical analysis. A definite compound, blue-gray CrOOH, is formed below 419-424°C. Rhombohedral dichromium trioxide is the stable phase above 450°. The possibility that a CrOOH-dichromium trioxide transition exists at 419-424°C. is discussed. Existence of a cubic chromium oxide isomorphous with γ-Fe_2O_3 or Fe_3O_4 is indicated. 16 ref.

9308 Preparation of S^{35}-Labeled Dioxide and Sulfuric Acid. B. J. Masters and T. H. Norris. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2395.

Method depends on occurrence of an exchange reaction between above two compounds and leads to high specific activities and good percentage yields.

9309 A Method For the Specific Conversion of Iodoform to Carbon Dioxide. W. W. Shreeve, F. Leaver, and I. Siegel. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2404.

Iodoform may be specifically converted to CO_2 via CO. The latter is generated by reaction of silver nitrate with iodoform, and the CO is specificially oxidized by a H_2SO_4-I_2O_5 mixture. Yield of CO_2 is 95% of theoretical.

9310 Cerium(III) Sulfide and Selenide and Some of Their Solid Solutions. E. Banks, K. F. Stripp, H. W. New-

kirk, and R. Ward. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2450-2453.

Relationship between complex and cubic phases of Ce_2S_3 was investigated by use of molten salts to extract the oxide from the complex form. Ce_2S_3 and Ce_2O_2Se were prepared and shown to be isomorphous with the corresponding sulfides. CeS was prepared by sodium reduction of Ce_2S_3 and is isomorphous with CeS. 12 ref.

9311 Structure and Catalytic Activity of Supported Manganese, Copper, and Iron Oxides. John Mooi and P. W. Selwood. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2461-2464.

Catalytic oxidation of CO by air over above supported oxides was studied. 11 ref.

9312 Heat Capacity of Potassium and Three Potassium-Sodium Alloys Between 0° and 800°, the Triple Point and Heat of Fusion of Potassium. Thomas B. Douglas, Anne F. Ball, Defore C. Ginnings, and William D. Davis. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2472-2478.

Measurements were made of changes in enthalpy of K and 3 K-Na alloys (containing approximately 45, 54 and 78% K) over the range 0-800°C. From the enthalpy values heat capacities were derived, as well as heat of fusion and relative entropy of K. Melting curve and triple point of K were also determined. 14 ref.

9313 The Heats of Combustion of the Methyl Substituted Hydrazines and Some Observations on the Burning of Volatile Liquids. John G. Ashton, Elizabeth J. Rock, and Saul Isserow. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2484-2486.

9314 Concerted Displacement Reactions. VIII. Polyfunctional Catalysis. C. Gardner Swain and John F. Brown, Jr. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2538-2543.

Proves for the first time that polyfunctional catalysis can occur. A polyfunctional catalyst is defined as one which uses concerted action by two or more groups, each acting on a different atom or point in the substrate. Such catalysts are devised for a typical polar displacement reaction, the mutarotation of tetramethylglucose in benzene solution; they prove to have extremely high catalytic activity at low temperatures and in very high dilution, to act independently of other acidic or basic species, and to show catalyst-substrate specificity unlike that of monofunctional catalysts but approaching that of enzymes. 16 ref.

9315 Preparation and Polymerization of Unsaturated Quaternary Ammonium Compounds. IV. Some Properties of the Polymers. George B. Butler, Robert L. Bunch, and Francis L. Ingley. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2543-2547.

Shows by titration that above polymers function as strongly basic ion-exchange resins.

9316 Chromatographic Resolution of Organic Acids With Progressively Changing Solvents. Lawrence M. Marshall, Kenneth O. Donaldson, and Felix Friedberg. *Analytical Chemistry*, v. 24, May 1952, p. 773-775.

A recent report described a new type of chromatography which employs solvents that progressively increased in polarity during the separation. A technique is described for computing these chromatographic positions. Migration of several organic acids in several solvent systems is analyzed by the simple equation derived. Broad possibilities of this newer type of chromatography are illustrated by the experimental data.

9317 Apparatus for Continuous Electrochromatography. Takuya R. Sato, William P. Norris, and Harold H. Strain. *Analytical Chemistry*, v. 24, May 1952, p. 776-778.

Electromigration plus chromatography serves for continuous resolution of mixtures of ionized solutes. Large electrochromatographic cells were designed, with special mechanical supports and a device for continuous addition of the solution of the mixture. This apparatus has been utilized for separating various ions. Paths of the ions in the cell were determined by radioautographs and by the use of specific reagents. Complete or absolute separations of oppositely charged ions were obtained.

9318 Dielectric Constant Meter for Kinetic Studies. Robert C. Axtmann. *Analytical Chemistry*, v. 24, May 1952, p. 783-785.

Diagrams show recording heterodyne-beat assembly for determining reaction-velocity constants by following small increments in the dielectric constant of the reaction medium.

9319 Instrument for Automatic Determination of Melting Point. Ralph H. Müller and Seymour T. Zenchelsky. *Analytical Chemistry*, v. 24, May 1952, p. 844-847.

Instrument described and diagrammed consists of an electrically heated hot stage with a servo potentiometer temperature indicator. Heating rates as low as 0.5°C. per min. are obtainable, and temperature may be read to 0.25°C. 14 ref.

9320 Automatic Fraction Collector for Column Chromatography. Oliver G. Lien, Jr., Elbert A. Peterson, and David M. Greenberg. *Analytical Chemistry*, v. 24, May 1952, p. 926-927.

Described and diagrammed.

9321* Calculation of Boiling Point and Dew Point of Ideal Multicomponent Mixtures. (In German.) F. Florin. *Brennstoff-Chemie*, v. 33, May 14, 1952, p. 161-166.

Method for above is described and graphically explained.

9322* Critical Solution Temperatures in Homologous Series of Primary Normal Alcohols. (In German.) L. v. Erichsen. *Brennstoff-Chemie*, v. 33, May 14, 1952, p. 166-172.

Describes and diagrams apparatus and procedure for measurement of the above. Data for several systems are charted, tabulated, and discussed. 17 ref.

9323 The Flow of Fluids Through Activated Carbon Rods. I. (No subtitle.) **II. The Pore Structure of Activated Carbon.** E. A. Flood, R. H. Tomlinson, and A. E. Leger. *Canadian Journal of Chemistry*, v. 30, Apr. 1952, p. 348-385.

Graphs, tables, and diagrams. 33 ref.

9324 Mass-Transfer Rate in Packed Columns; Its Analogy to Pressure Loss. Sabri Ergun. *Chemical Engineering Progress* (Engineering Section), v. 48, May 1952, p. 227-236.

Theoretical, mathematical analysis. A new general form of mass-transfer factor, applicable to all packed beds, is introduced. Existence of a 1-1 correspondence between the new mass-transfer factor and the new friction factor, introduced earlier for pressure drop in packed columns, is shown. Relationships developed are tested with the published data and their applicability demonstrated. 22 ref.

9325 Friction and Transfer Coefficients for Single Particles and Packed Beds. W. E. Ranz. *Chemical Engineering Progress* (Engineering Section), v. 48, May 1952, p. 247-253.

Method of analysis based on properties of a single particle for estimating and characterizing transfer rates and pressure drops in packed beds. Equations for estimating effective thermal conductivity and diffusivity are derived, and parametric constants relating actual fluid velocity and average lateral velocity to superficial velocity are shown to characterize the performance of packed beds. 23 ref.

9326 Multicomponent Distillation. III. Equations in Product Form and Simplified Application. P. G. Murdoch and C. D. Holland. *Chemical Engineering Progress* (Engineering Section), v. 48, May 1952, p. 254-260.

9327 Ferromagnetic Spinels Using Lithium. Robert S. Weisz. *Ceramic Industry*, v. 58, Apr. 1952, p. 130-131, 133-134.

Preparation and magnetic properties of the systems Li_2O-ZnO-Fe_2O_3 and Li_2O-CdO-Fe_2O_3 are described. Possible uses and other properties of the materials are briefly discussed. Theoretical reasons for the low magnetic losses of $LiFe_5O_8$ at high frequencies are presented. (To be concluded.)

9328* The Reaction Between Ferric and Iodide Ions. Part I. Kinetics and Mechanism. A. J. Fudge and K. W. Sykes. **Part II. The Influence of Ionic Association.** K. W. Sykes. *Journal of the Chemical Society*, Jan. 1952, p. 119-129.

In Part I, measurements were made at constant ionic strength and with the ferric ion present in its simple hydrated form without appreciable complex formation. The main features of the

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dependence of the rate of reaction on the various concentrations are represented by a formula.

9329* Absorption of Electrolyte by Alginate Gels Without and With Cation Exchange. I. L. Mongar and Albert Wassermann. *Journal of the Chemical Society*, Feb. 1952, p. 429-497.

Various stoichiometric relationships characterizing interaction of fully swollen fibrous alginates with simple electrolytes are established. Shows that these gels are cation-exchange materials.

9330* The Intrinsic Viscosity of Sodium Alginate. M. L. R. Harkness and Albert Wassermann. *Journal of the Chemical Society*, Feb. 1952, p. 497-499.

The viscosity of sodium alginate in solutions of simple electrolytes was determined to estimate average distance between the ends of the alginate chains.

9331* The Kinetics of the Dissolution of Zinc in Aqueous Iodine Solutions. Parts III and IV. A. C. Riddiford and L. L. Bircumshaw. *Journal of the Chemical Society*, Feb. 1952, p. 698-704.

In Part III, Zn, Cu, amalgamated Cu, brass, Pb, and Ni were found to dissolve in aqueous iodine solutions at the same rate under the same experimental conditions. Observed rate of dissolution of Zn was independent of crystal face exposed to attack, but was a function of the rate of stirring. Results agree with Levich's theory. In Part IV, the fluid flow is discussed. The reaction may be used to characterize fluid flow in other solid-liquid systems.

9332* On the Chemical Kinetics of Autosynthetic Systems. Cyril N. Hinshelwood. *Journal of the Chemical Society*, Mar. 1952, p. 745-755.

General treatment of chemical kinetics of certain types of coordinated reactions. It is shown that, where several components are synthesized by the use of mutually supplied intermediates, there is a steady state in which each separate component increases according to the simple exponential law of autosynthesis. Indicates the relation of the equations derived to phenomena shown by living cells. A hypothesis about the mode in which new enzymes may arise in response to new substrates is outlined.

9333* Amorphous Carbon. Thomas D. Smith. *Journal of the Chemical Society*, Mar. 1952, p. 923-927.

Carbons, prepared by carbonization of organic compounds, were examined by X-ray diffraction and gas adsorption. The presence of oxygen in the organic molecule profoundly affects the crystallographic character of the resultant chars.

9334* Some Measurements of the Self-Diffsuion Coefficients of Liquids. K. Graupner and E. R. S. Winter. *Journal of the Chemical Society*, Mar. 1952, p. 1145-1150.

By use of deuterium as a tracer element, self-diffusion coefficients of water, C_6H_6, C_2H_5Br, and C_2H_5OH were measured over the range 15-45°C. For water, some measurements were also made using O^{18}.

9335* The Preparation and Properties of Selenium Tetrafluoride and Oxyfluoride. E. E. Aynsley, R. D. Peacock, and P. L. Robinson. *Journal of the Chemical Society*, Apr. 1952, p. 1231-1234.

Preparation of $SeOF_2$ from SeO_2 is described in which there is no accompanying formation of any oxy-compound of sexavalent Se.

9336* The Heats of Formation of Germanium Tetrabromide and Germanium Tetraiodide. D. F. Evans and R. E. Richards. *Journal of the Chemical Society*, Apr. 1952, p. 1292-1294.

Heats of solution of the above compounds and of GeO_2 in 1.2N NaOH solution were measured. From these results, formation heats were deduced. Bond energies and stabilization energies of the Ge-Br and the Ge-I link in these compounds are also given.

9337* The Electrolytic Dissociation of Strontium Iodate and of Strontium Hydroxide. C. A. Colman-Porter and C. B. Monk. *Journal of the Chemical Society*, Apr. 1952, p. 1312-1314.

Conductivities of dilute aqueous solutions of strontium iodate at 25°C. were measured. The solubility of the salt in water and in NaOH solutions at 25°C. was also measured and used to derive the dissociation constant of $Sr(OH)^+$.

9338* Atoms and Radicals in Aqueous Media. F. S. Dainton. *Journal of the Chemical Society*, Apr. 1952, p. 1533-1546.

Aim of the Tilden Lecture was discussion of the lines of reasoning which are applicable to the above phenomena. Includes graphical and tabular data reproduced from various sources.

9339* Transient Entities in Chemical Reactions. H. W. Melville. *Journal of the Chemical Society*, Apr. 1952, p. 1547-1556.

Liversidge Lecture, delivered before the Chemical Society, discusses concept of certain types of reactions in which atoms and radicals play an important part. Includes graphs and diagrams reproduced from work of various investigators.

9340* The Trans Effect in Complex Inorganic Compounds. J. V. Quagliano. *Chemical Reviews*, v. 50, Apr. 1952, p. 201-260.

Tables and diagrams. 157 ref.

9341* Application of Solubility Diagrams. (In French.) R. Flatt. *Chimia*, v. 6, Mar. 1952, p. 53-66.

Discusses application of the above to various salt solutions. Method of interpretation, practical significance for research on sea water, and for production of potassium salts from natural deposits, is outlined. Diagrams and micrographs.

9342* The Physical and Mathematical Basis for the Transfer of Heat and Material. (In German.) K. Nesselmann. *Chimia*, v. 6, May 15, 1952, p. 106-112.

Outlines theoretical basis of the above. The methods for calculating both processes are outlined. Treats in particular the problems of heat transfer and diffusion, transfer of heat and material in forced turbulent flow, and the physical mechanism of heat and material transfer. 19 ref.

9343 Electro-Organic Chemistry. H. Jermain Creighton. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 127C-130C.

Historical review of progress in the above. Considers various classic investigations; also means for extending scope of this field. 46 ref.

9344 Electrodeposition Behavior of a Simple Ion. II. Precipitation Into a Liquid Electrode (Mercury). L. B. Rogers. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 267-271.

Distribution of a trace of an element between an aqueous solution of its salt and a mercury cathode is considered to be a special example of solvent extraction in which distribution is a function not only of the volume of the liquids but also of the cathode potential. Discusses method of improving separations by adjusting the ratio of the volumes of mercury and aqueous solution before electrolysis. 14 ref.

9345* The Thermodynamics of Humid Air. Boris N. Cole. *Engineering*, v. 173, May 16, 1952, p. 609-612.

Topics discussed are: "conventional" humidity corrections and their limitations; isentropic expansion with vapor equilibrium, with mention of the piston-motor; acoustic velocity in wet air; steady flow through a convergent nozzle with vapor equilibrium, with special reference to flow measurement; and finally, the same, but with condensation shock.

9346 The Vapour Pressures of Isotopic Substances. I. Boron Trichloride. M. Green and G. R. Martin. *Transactions of the Faraday Society*, v. 48, May 1952, p. 416-421.

Natural BCl_3 was investigated in a packed fractionating column of high efficiency to determine relative volatilities of isotopic boron chlorides. Measurement of B^{10} concentration was made also. Apparatus diagram, graph, and tables.

9347 The Phase Transitions in the Solid Hydrogen Halides. J. G. Powles. *Transactions of the Faraday Society*, v. 48, May 1952, p. 430-439.

Interprets above with respect to properties of different phases and to mechanism of transitions. Summarizes relevant published data and proposes models for the phases. Tables and graphs. 29 ref.

9348 The Hydration of Acetaldehyde in Aqueous Solution. R. P. Bell and J. C. Clunie. *Transactions of the Faraday Society*, v. 48, May 1952, p. 439-442.

Calorimetric and spectrophotometric methods were used to determine heat of solution and hydration of CH_3CHO in dilute aqueous solution, and its degree of hydration in the range 0-54°C. Graph and tables. 15 ref.

9349 Carbonium Ion Reactions: A Study of Their Rates and Mechanisms. J. L. Franklin. *Transactions of the Faraday Society*, v. 48, May 1952, p. 443-453.

Calculations were made of thermodynamic values of alkyl carbonium ions; of constants for hydrolysis of alkyl halides in aqueous ethanol, of hydration of isobutene, of dehydration of tert-butanol; and of rates of these reactions. Tables. 24 ref.

9350 Adsorption and the Hydrogen Overpotential. P. J. Hillson. *Transactions of the Faraday Society*, v. 48, May 1952, p. 462-473.

Hydrogen overpotential and capacity of the working electrode were measured on electrodes of Hg, Ni, W, Ta, Au, and Ag in the presence of n-hexyl alcohol, n-caproic acid, n-hexylamine hydrochloride and p-toluene sulfonic acid. Considers differential effects of these capillary-active substances. Calculates hydrogen overpotential of various metals from literature data. Apparatus diagram, tables, and graphs. 17 ref.

9351* Fractionation of Carbon Isotopes in the Absorption of Carbon Dioxide. (In German.) Peter Baertschi. *Helvetica Chimica Acta*, v. 35, no. 3, 1952, p. 1030-1036.

Shows experimentally that solutions of alkali absorb $C^{12}O_2$ 1.014 times faster than $C^{13}O_2$ from an isotopic mixture. This fact is shown to be an important source of error in determination of C^{13}-C^{12} ratio. Its importance to the assimilation of CO_2 by plants is discussed. Data are tabulated. 16 ref.

9352 Solubility of Hydrogen, Oxygen, Nitrogen, and Helium in Water at Elevated Temperatures. H. A. Pray, C. E. Schweickert, and B. H. Minnich. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1146-1151.

Numerous graphs and tables.

9353* Fundamental Studies on Adsorption in Bed. (In English.) Yoshitami Fukuda and Kunitaro Kawasoe. *Japan Science Review*, v. 2, Apr. 1951, p. 13-20.

Theoretical formulas for the industrial adsorption operation using the percolation method are derived. Includes experimental verification. Graphs and tables.

9354* A Method For the Determination of the Solubility of Gases in Liquids With Particular Reference to Viscous Liquids. R. R. Baldwin and S. G. Daniel. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 161-165.

Apparatus described and diagrammed. Figures illustrating accuracy obtainable are given for lubricating oils with a range of viscosity, and necessary modifications for normal liquids are indicated. 10 ref.

9355* A Fractionating Stillhead of Improved Design. N. Payne and L. E. Perrins. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 208-213.

Improved type. Works on the vapor-splitting principle, which gives a constant reflux ratio independent of variations in pressure or boil-up rate. Diagram.

9356 Thermodynamic Properties of the Fluorine Atom and Molecule and of Hydrogen Fluoride to 5000°K. Leland G. Cole, M. Farber, and G. W. Elverum, Jr. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 586-590.

Evaluation of the thermodynamic functions was made by statistical calculations from available spectral constants. Tables. 43 ref.

9357 The Lennard-Jones 12:6 Potential and the Viscosity of Gases. E. Whalley and W. G. Schneider. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 657-661.

A discussion. Predicted and experimental viscosities agree well at moderate temperatures, but agreement is not so good at higher temperatures, and for some gases, no possible choice of the force parameters will predict the correct temperature variation of the viscosity at high temperature. Tables and graphs. 70 ref.

9358 The Spectra of HCl, NH_3, H_2O, and H_2S From 100 to 700 Microns. T. King McCubbin, Jr. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 668-671.

Apparatus diagram, tables, and spectrograms. 11 ref.

9359 Effect of Oxygen on the Ferrous-Ferric Exchange Reaction. Lois Eimer, A. I. Medalia, and R. W. Dodson. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 743-744.

Apparatus diagram, graph, and table.

9360 Emission Spectrum of HCl in the Near Infrared. Roger Newman. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 749-750.

Spectrum was obtained from a flame consisting of a jet of Cl_2 burning in an atmosphere of H_2. Spectrograms.

9361 High Values For the Electrical Breakdown Strength of Liquids. W. D. Edwards. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 753-754.

A note giving further information on the above for some pure organic liquids of simple structure. The reported values are up to 100% in excess of published data. Tables.

9362 X-Ray Diffraction of Heat-Treated Carbon Blacks. H. T. Pinnick. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 756-757.

A study of the above, with particle sizes ranging from 50A-3000A., all graphitized to 3000°C. The half-widths of the asymmetric 10 line were measured, and the crystallite diameters calculated using Warren's formula.

9363 Gaseous Detonations. III. Dissociation Energies of Nitrogen and Carbon Monoxide. IV. The Acetylene-Oxygen Mixtures. G. B. Kistiakowsky, Herbert T. Knight, and Murray E. Malin. *Journal of Chemical Physics*, v. 20, May 1952, p. 876-887.

In Part III, detonation velocities were measured in mixtures of C_2N_2 and O_2 at several pressures and in tubes of several diameters, with a reproducibility of the order of 0.1%. Thermodynamic calculations of detonation velocities were carried out for several assumed heats of dissociation of N_2 and of CO and for several experimental conditions. Methods are described for extrapolation of experimental velocities to the limit of an infinite plane wave in ideal gases. In Part IV, detonation velocities were accurately measured in C_2H_2-O_2 mixtures ranging in composition from 7-90% C_2H_2 at 1 atm. total pressure. Thermodynamic calculations of velocities are compared with experimental data 43 ref.

9364* The Spreading of Liquids on Low-Energy Surfaces. II. Modified Tetrafluoroethylene Polymers. H. W. Fox and W. A. Zisman. *Journal of Colloid Science*, v. 7, Apr. 1952, p. 109-121.

A study of the above, with data presented on the equilibrium contact angles of a wide variety of liquids on specially prepared surfaces of halogenated derivatives of polyethylene. Free-energy decrease of immersion, work of adhesion, and spreading coefficients were calculated for liquids which do not spread. Table and graphs.

9365* The Process of Spontaneous Emulsification. M. van der Waarden. *Journal of Colloid Science*, v. 7, Apr. 1952, p. 140-150.

A study of the above by means of hydrocarbon sulfonate systems and a discussion of the possible mechanism involved. Tables, graphs, and diagram.

9366* The Spreading of Liquids on Low-Energy Surfaces. IV. Monolayer Coatings on Platinum. Elaine G. Shafrin and William A. Zisman. *Journal of Colloid Science*, v. 7, Apr. 1952, p. 166-177.

Presents wettability data for about 60 diverse liquids applied

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to a smooth Pt surface coated with a monolayer of n-octadecylamine. Gives general discussion on wetting behavior of surfaces. Tables and graphs. 11 ref.

9367 Symposium on Radiation Chemistry. *Journal of Physical Chemistry,* v. 56, May 1952, p. 545-603.

Consists of introduction by Milton Burke plus the following papers: "Storage of Radiation Energy in Crystalline Lithium Fluoride and Metamict Minerals", Frederick F. Morehead, Jr., and Farrington Daniels; "Some Observations of Luminescence of Alkali Halide Crystals Subject to Ionizing Radiation", J. A. Ghormley and H. A. Levy; "Elementary Processes in Radiation Chemistry. III. Charge Transfer Mechanisms," John L. Magee; "Radiolysis of Hydrocarbon Mixtures," J. P. Manion and Milton Burton; "Detection and Identification of Free Radicals in the Radiolysis of Alkanes and Alkyl Iodides," Lewis H. Gevantman and Russell R. Williams Jr.; "Decomposition of Water and Aqueous Solutions Under Mixed Fast Neutron and γ-Radiation," A. O. Allen, C. J. Hochanadel, J. A. Ghormley, and T. W. Davis; "Effects of Cobalt γ-Radiation on Water and Aqueous Solutions," C. J. Hochanadel. "The Radical Paid Yield of Ionizing Radiation in Aqueous Solutions of Formic Acid," Edwin J. Hart; "Recoil Atoms From Slow Neutron Capture By Gold and Indium Surfaces," Samuel Yosim and T. H. Davies.

9368 Oxide Film Formation on the Surface of Metallic Mercury in Aqueous Solutions and the Anomaly Between Its Potential and That of the Mercury-Mercuric Oxide Electrode. S. E. S. El Wakkad and T. M. Salem (Mrs. S. E. S. El Wakkad). *Journal of Physical Chemistry,* v. 56, May 1952, p. 621-625.

Above studied by the anodic behavior of Hg utilizing both the cathode-ray-oscillograph method and the direct potentiometric method and by the effect of bubbling O_2 through the solution. Apparatus diagram and oscillograms. 11 ref.

9369 The Role of Adsorption in the Reduction of Organic Mercury Compounds at the Dropping Mercury Electrode. Ruth E. Benesch and Reinhold Benesch. *Journal of Physical* Chemistry, v. 56, May 1952, p. 648-653.

Table and polarograms.

9370 A Study of the Functional Groups of Cation Exchangers By Infrared Absorption. Kenneth T. Waldock and Laurence D. Frizzell. *Journal of Physical Chemistry,* v. 56, May 1952, p. 654-657.

Spectrograms. 19 ref.

9371 Low Vapor Pressure Measurement and Thermal Transpiration. S. Chu Liang. *Journal of Physical Chemistry,* v. 56, May 1952, p. 660-662.

A contribution, with corrections, to recent work on the above. Treats the thermal transpiration effect for CH_4, C_2H_2, and C_2H_4 and outlines a method by which a correction may be estimated without actually determining the effect for individual gases. Graph and tables.

9372 The Catalytic Activity of Some Reduced Vanadate Salts. C. S. Rohrer, R. C. Christena, and O. W. Brown. *Journal of Physical Chemistry,* v. 56, May 1952, p. 662-664.

A systematic study of the variables concerned in obtaining the maximum activity of reduced Ni, Cu, and Pb vanadates for the gas-phase reduction of 1-nitronaphthalene to 1-naphthylamine. Tables and graph.

9373* A Multi-Electrode All-Glass Cap for Electrolytic Cells. E. C. Potter. *Journal of Scientific Instruments,* v. 29, May 1952, p. 160.

New development confers greater versatility on all-glass apparatus for studies in the field of electrode kinetics.

9374* Viscosity as a Materials Constant. (In German.) H. Umstätter. *Kautschuk und Gummi,* v. 5, Apr. 1952, p. WT58-WT59.

Examines critically discrepancies in above between theory and practice, and discusses mathematically the factors which affect viscosity.

9375* Non-Newtonian Surface Viscosity. (In German.) M. Joly. *Kolloid Zeitschrift,* v. 126, Apr. 1952, p. 35-51; disc., p. 51-52.

Discusses the close correlation between structure of surface films and their rheological properties. Methods of measuring surface viscosity are described. Diagrams and tables. 37 ref.

9376 Heat Capacity of Gaseous Carbon Dioxide. Joseph F. Masi and Benjamin Petkof. *Journal of Research of the National Bureau of Standards,* v. 48, Mar. 1952, p. 179-187.

Above was measured at −30, +50, and +90°C. and at 0.5-, 1.0-, and 1.5-atm. pressure, with an accuracy of 0.1% using a flow calorimeter. New derived values were calculated. Apparatus diagram, tables, and graphs. 29 ref.

9377* Spontaneous Decomposition of Hydrogen Peroxide. (In German.) E. Abel. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften,* v. 83, no. 2, 1952, p. 422-439.

Review of literature shows mechanism to be independent of any extraneous influences, such as reducing agents, catalysts, etc. Tables and graphs.

9378* Application of the Method of Radioactive Isotopes to the Study of the Mechanism of Chemical Reactions. (In French.) Pascaline Daudel. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1952, p. 23D-27D.

Reviews the above on the basis of the literature. Discusses particularly radioactivity as a method of analysis in kinetic research, and in the tracing of a particular type of atoms. 68 ref.

9379 Magnetic Susceptibilities of Europium Sesquioxide and of Uranium Dioxide at Low Temperatures. B. M. W. Trapnell and P. W. Selwood. *Nature,* v. 169, May 17, 1952, p. 840-841.

Determined in range of 20-300°K.

9380 The Determination of Heats of Mixing. G. H. Cheesman and A. M. Beryl Whitaker. *Proceedings of the Royal Society,* ser. A, v. 212, May 7, 1952, p. 406-425.

Calorimeter designed for measuring heats of mixing of binary liquid system eliminates need to correct for changes in composition of the vapor phase on mixing. Improved accuracy was thus obtained. Heats of mixing were measured for binary systems formed from CCl_4, $CHCl_3$, and CH_2Cl_2 and also for the systems $C_6H_6+CCl_4$ and $C_6H_6+C_2H_4Cl_2$. Diagrams and tables. 10 ref.

9381* On the Equilibria of Uranium Oxides Between UO_2 and U_3O_8. (In French.) H. Hering and P. Perio. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1952, p. 351-357. Mar.-Apr. p. 351-357.

Proposes an equilibrium diagram on the basis of studies made by radiography of powders. Results of measurements at various temperatures are indicated, and tabulated in detail.

9382* Anomalies of Properties Accompanying the Transformation of λ-Type Nickelous Oxide. (In French.) Marc Foex. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1952, p. 373-379.

The anomalies of electrical conductivity and chemical activity, observed in NiO near +250°C., are discussed. Relationship of this behavior to evolution of the crystal structure is indicated. Tables, charts, and 66 ref.

9383* Study of the Chemical Systems P_2O_5-CaF_2 and P_2O_5-Fluoroapatite. (In French.) Gérard Montel. *Bulletin de la Société Chimique de France,* Mar.-Apr. 1952, p. 379-382.

Results of chemical and spectrographic investigation.

9384* Chain Reactions in Chemistry. (In Russian.) N. N. Semenov. *Uspekhi Khimii,* v. 20, Nov.-Dec. 1951, p. 673-713.

A review. 67 ref.

9385* Measuring Cathodic Oxygen Reduction by Means of Suitable Model Elements. (In German.) F. Tödt. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 165-169.

Supplementary to a previous article, it is shown that reduction of oxides on Au as well as on Pt can be studied by measuring capacitance and galvanic current generated by action of oxygen, even though the layer be less than monoatomic in average thickness. Tables and graphs.

9386* Polarization Capacitance, Adsorption, and Overvoltage of Hydrogen on Platinum. (In German.) E. Wicke and B. Weblus. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 169-176.

Mechanism of hydrogen exchange between electrode and electrolyte and of hydrogen overvoltage depends mainly on degree of coating of electrode with adsorbed hydrogen. Effect of electrolyte composition on polarization capacitance and, thus, hydrogen adsorption was investigated, results indicating that overvoltage is a result of slow discharge of hydrogen ions at the surface of the Pt electrode. Data are charted.

9387* Glow-Discharge Electrolysis. XX. Behavior of Aqueous Solutions of Formic Acid, Sodium Acetate, and Acetic Acid. (In German.) Alfons Klemenc. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 198-205.

Includes tables and numerous references.

9388* Thermodynamics of the Decomposition of Pyrite. (In German.) Günter Wunderlich. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 218-223.

Describes determination of the molecular dimensions of sulfur formed from pyrite decomposition by comparing computed with experimental data on thermodynamic equilibrium as a basis for exact calculation of dissociation pressures between 300 and 950°C. 16 ref.

9389* Fluorite Phases in the Praseodymium Oxide-Uranium Oxide System. (In German.) F. Hund and U. Peetz. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 223-228.

Describes preparation of experimental mixtures of nitrates of Pr and U and presents results of their x-ray examination and density determination. Tables and graphs. 30 ref.

9390* Thermodynamic Analysis of Solutions of Polymethacrylic Acid Ester in Different Solvents. (In German.) G. V. Schulz and H. Doll. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie,* v. 56, Mar. 1952, p. 248-257.

Describes measurements of osmotic pressure as function of concentration of solvent, and of temperature. Tables and graphs. 25 ref.

9391* A Zinc-Hydrogen Iodide, ZnHI. (In German.) Egon Wiberg and Walter Henle. *Zeitschrift für Naturforschung,* v. 7b, Apr. 1952, p. 249.

Shows that ZnI_2 and LiH react in an ether solution to form solid zinc-hydrogen iodides whose iodine contents vary with experimental conditions, but never exceed that of the formula ZnHI.

9392* A New Method of Preparing the Copper Hydride CuH. (In German.) Egon Wiberg and Walter Henle. *Zeitschrift für Naturforschung,* v. 7b, Apr. 1952, p. 250.

Reaction described proceeds according to the equation

$$4\ CuI + LiAlH_4 \rightarrow LiI + AlI_3 + CuH.$$

Method of isolating the CuH and its properties are briefly discussed.

9393* A Silver-Aluminum Hydride $AgAlH_4$. (In German.) Egon Wiberg and Walter Henle. *Zeitschrift für Naturforschung,* v. 7b, Apr. 1952, p. 250-251.

Silver perchlorate and lithium aluminum hydride dissolved in ether react at −80°C. to form the ether-soluble solid compound $AgAlH_4$, which decomposes above −50°C.

9394* Caking of Carbon Salts. (In Russian.) A. Ia. Zvorykin. *Zhurnal Prikladnoi Khimii,* v. 24, Nov. 1951, p. 1131-1135.

A study was made of the nature of the caking process in carbonates of Li, Na, K, Be, Mg, Ca, Sr, Cd, and Ba. Tables and graphs.

9395* The Gaseous Phase in the Calcining of Chromites. (In Russian.) O. I. Pudovkina and N. A. Gushchina. *Zhurnal Prikladnoi Khimii,* v. 24, Nov. 1951, p. 1136-1139.

Laboratory experiments on the above showed that, for satisfactory oxidation of Cr_2O_3 to CrO_3, the furnace gases must contain not less than 7.5-10% O_2. Data are tabulated.

9396* Optimum Conditions of Operation of Packed Extraction Columns. (In Russian.) V. V. Kafarov and M. A. Planovskaya. *Zhurnal Prikladnoi Khimii,* v. 24, Dec. 1951, p. 1225-1233.

On the basis of experiments, above conditions were established for the above. Shows relationship between hydrodynamic conditions and effective work, and between mass-transfer and hydrodynamic factors. A scheme is developed for determination of basic dimensions for packed extraction columns. Graphs.

9397* Investigation of the Hydrodynamics of Packed Rectification Columns. (In Russian.) V. V. Kafarov and I. L. Bliakhman. *Zhurnal Prikladnoi Khimii,* v. 24, Dec. 1951, p. 1274-1290.

Describes and diagrams special apparatus and procedure used for above investigation. Data are charted.

9398* Heat Capacity of the Halide Salts KCl, KBr, and KI at High Temperatures. (In Russian.) S. M. Skuratov and S. A. Lapushkin. *Zhurnal Obshchei Khimii,* v. 21(83), Dec. 1951, p. 2217-2220.

Studies were made of the above from 20 to 660°C. Equipment is described and diagrammed, and results are discussed.

9399* Study of Colored Complexes of Titanium With Hydrogen Peroxide. (In Russian.) A. K. Babko and A. I. Volkova. *Zhurnal Obshchei Khimii,* v. 21(83), Nov. 1951, p. 1949-1956.

It was shown experimentally that Ti forms two complexes with H_2O_2. The structures and properties of these compounds were determined. Data are tabluated and charted.

Miscellaneous Publications

9400 Electrochemical Equilibria. (In French.) M. Pourbaix. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Liberia Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 11-14; disc., p. 14. (QC311 C73c)

Presents a brief report on the thermodynamics of electrochemical reactions and electrochemical equilibrium diagrams, describing their use. 13 ref.

9401 Considerations on Electrochemical Kinetics. (In French.) R. Piontelli. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 79-104. (QC311 C73c)

Discusses in general the processes of exchange of ions between metals and solutions of their simple salts, also laws which tie current density to electrode voltage. Schematic diagrams. 16 ref.

9402 Oscillographic Study of Transitory Diffusion Systems. (In French.) L. Gierst and A. Juliard. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 117-132; disc., p. 132-133. (QC311 C73c)

From the curves obtained when electrolysis of a relatively concentrated solution of any depolarizer is performed using various constant current densities, it is possible to show the principal factors which may influence the kinetics of the discharge. Includes charts.

9403 Potential-pH Diagram of Lead. Electrochemical Behavior and Corrosion of Lead. Lead Batteries. (In French.) P. Delahay, M. Pourbaix, and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 15-28. (QC311 C73c)

The electrochemical equilibrium diagrams of the $Pb\text{-}H_2O$ system, and of the $Pb\text{-}CO_2\text{-}H_2O$ and $Pb\text{-}SO_4\text{-}H_2O$ systems are established as a function of pH and potential. These diagrams are applied to a study of the electrochemical behavior of Pb and its compounds; to the study of corrosion, passivation, and passivity of Pb; and to the study of lead cells. Diagrams and graphs. 11 ref.

9404 Potential-pH Diagram of Silver. Electrochemical Behavior and Corrosion of Silver. (In French.) P. Delahay,

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M. Pourbaix, and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 29-33. (QC311 C73c)

The electrochemical equilibrium diagram of the Ag-H_2O system was established as a function of the pH and the potential. This diagram was applied to a study of the electrochemical behavior of Ag and its compounds, and to a study of the corrosion of Ag. Includes diagrams.

9405 Potential-pH Diagram of Zinc. Electrochemical Behavior and Corrosion of Zinc. (In French.) P. Delahay, M. Pourbaix, and P. Van Rysselberghe. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 34-41. (QC311 C73c)

The electrochemical equilibrium diagrams of the Zn-H_2O and Zn-CO_2-H_2O systems are established as a function of the pH and potential. They are applied to study of the electrochemical behavior of Zn and its compounds, and to the study of corrosion of Zn. Includes diagrams.

9406 Study of the Electrochemical Behavior of an Element Using Electrolysis Curves. (In French.) A. Juliard, C. Rorive-Boute, and D. Bermane. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 69-74; disc., p. 75-76. (QC311 C73c)

Discusses analysis of an electrolysis curve giving variation of intensity of the electrolysis current as a function of difference of voltage applied between an electrode with a large surface, which is nonpolarizable, and a microelectrode, dipped in a solution of a given element, making it possible to establish a series of characteristic redox potentials which show electrochemical behavior of the element. With the aid of this technique, electrolysis curves were established for solutions of $Pb(NO_3)_2$, $AgNO_3$, and $FeSO_4$, with different pH's, in the absence or presence of different electrolytes. Includes charts.

9407 The Thermodynamics of Combustion Gases: General Considerations. Stuart R. Brinkley, Jr., and Bernard Lewis. U. S. Bureau of Mines, Report of Investigations 4806, Apr. 1952, 61 pages. (TN21 Un3r)

Consideration of the thermodynamics of combustion gases is introduced by a discussion of the stoichiometry of multicomponent systems and of applications of the phase rule to such systems. Two methods are described for calculation of equilibrium composition of systems of many constituents. These methods are employed in formulation of several specific computational programs for calulation of equilibrium composition of systems. composed of compounds of C, H_2, O_2, and N_2. 23 ref.

Books

9408 The Thermodynamics of the Steady State. K. G. Denbigh. 103 pages. 1951. Methuen & Co., Ltd., London. (QC311 D41t)

A pocket-sized monograph comprising introduction plus chapters on: The Thomson Hypothesis Applied to Thermal Migration Phenomena; Onsager's Theory; The Rate of the Entropy Increase in Natural Processes; Some Applications of the Theory; Thermal Migration, Diffusion Potential, Etc.; and Thomson's Hypothesis in Relation to the Theory of Onsager.

9409 Comite International de Thermodynamique et de Cinetique Electrochimiques. (International Committee on Electrochemical Thermodynamics and Kinetics.) Proceedings of the 2nd meeting, 1950, 407 pages. 1951. Libreria Editrice Politecnica Cesare Tamburini, Milan, Italy. (QC311 C73c)

Presents papers and discussions given at above meeting. Divided into the following sections: electrochemical equilibria, electrochemical kinetics, application to the study of corrosion, application to the study of general chemistry and analytical chemistry, polarography, and electrochemical nomenclature and definitions. Selected papers are abstracted separately.

See also:
8404 (thermodynamics of slag equilibria)
8422 (reduction of oxides by carbon)
8647 (isotopic exchange betwen Ag and its ions)
8678 (hydrogen evolution at Ni cathodes)
8679 (heat capacity of uranium compounds)
8798 (sonic and ultrasonic vibrations vs. electrochemical processes)
8904 (absorption in the near infrared)
9002 (determining heat capacity of powders)
9155 (sublimation energy of carbon)
9219 (physical chemistry of basic chromic chlorides)
9512 (surface tension of polymer solutions)
9641 (colloid-chemical properties of clays)
9651 (ultrasonics vs. crystallization rate)
9658 (physics of powder dispersions)

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9410* Isomerization of Methylcyclopentane in the Presence of Aluminum Chloride Under Pressure. (In Russian.) M. G. Konikberg, A. F. Plate, and A. E. Gavrilova. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 81-83.

9411* Mechanism of Nitration and Oxidation of Cyclohexane. (In Russian.) A. I. Titov and M. K. Matveeva. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 101-104.

9412* Activation of Dehydrogenated Skeletal Nickel. (In Russian.) L. Kh. Freidlin and K. G. Rudneva. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 105-108.

Presents results of a study of activation of above catalyst, showing comparative kinetics of hydrogenation of several organic compounds, with the Ni catalyst in different states as regards hydrogenation.

9413* Homogeneous Catalysis of Oxidation of Hydrocarbons. (In Russian.) Z. K. Maizus and N. M. Emanuel. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 717-720.

Kinetics of the oxidation process of propane-oxygen mixtures with HBr, Br_2, $H_2 + Br_2$, Cl_2, HCl, and NO_2 were studied. Data are charted.

9414* Action of Halogen Derivatives on Magnesium Nitride. (In Russian.) A. Kh. Khomenko. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, Nov.-Dec. 1951, p. 806-808.

The reactions of various organic halogen compounds on Mg_3N_2 were investigated. It was found that tetramethyammonium can be formed by methyl iodide and Mg_3N_2.

9415 Directed Chlorination of Fluorinated Aliphatic Ethers. J. D. Park, D. M. Griffin, and J. R. Lacher. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2292-2294.

Study of the photochemical chlorination of fluorinated aliphatic ethers of the type $ROCF_2CX_2H$ (R = CH_3– or C_2H_5–; X = Cl, F, or H). Physical properties were determined for the chlorinated fluoroethers. 15 ref.

9416 Reaction of Methyl Radicals With Hydrogen and Deuterium. Sol Davison and Milton Burton. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2307-2312.

Free CH_3 radicals produced by photolysis of CH_3COCH_3 or CH_3CHO in presence of D_2 or mixtures of H_2 and D_2 yield various ratios of CH_4 and CH_3D determined by competition for CH_3 radicals by the different compounds present. By this method, the reaction between free CH_3 and molecular H_2 is established as $CH_3 + H_2 \rightarrow CH_4 + H$. 24 ref.

9417 Di-n-Propylgermanium Esters, Halides, Oxides and Sulfate. Herbert H. Anderson. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2370-2371.

Preparation and properties.

9418 Monoethylgermanium and Alkylsilicon Esters. Dimethylgermanium Diacetate. Herbert H. Anderson. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2371-2372.

Preparation and properties.

9419 Micro-Syntheses With Tracer Elements. V. The Synthesis of Formaldehyde-C^{14} and of Glyoxylic-1,2-C_2^{14} Acid. Arthur Murray, III, C. Wayne Bills, and Anthony R.

Ronzio. **VI. The Synthesis of Silver Cyanate Labeled With C^{14} and of Urea Labeled With C^{14} and N^{15}.** D. Lloyd Williams and Anthony R. Ronzio. *Journal of American Chemical Society*, p. 2405-2407.

9420 Mechanism of the Formation of the Diphenyliodonium Ion. J. B. Th. Aten and A. H. W. Aten, Jr. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2411-2412.

Mechanism of the reaction of a mixture of iodosobenzene and iodoxybenzene with AgOH was investigated by means of a radiochemical technique.

9421 A Synthesis of α or β-C^{14}-Labeled Glycerol. L. I. Gidez and M. L. Karnovsky. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2413-2415.

18 references.

9422 Hydrogenation of Fatty Acids to Alcohols. P. T. Adams, R. E. Selff, and B. M. Tolbert. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2416-2417.

A procedure for converting fatty acids to the corresponding alcohols by high-pressure hydrogenation of the mixed Cd-Ni salts of the acid in the presence of copper chromite. Reductions were made on normal and branched-chain C_1-C_5-acids with yields of 70-95%. The preparation was applied to small-scale synthesis of a number of C^{14}-labeled alcohols and these were converted to the corresponding halides for use as synthesis intermediates. 13 ref.

9423 Small Scale Preparation of Carbon-14 Labeled Succinic, Malic, Fumaric and Tartaric Acids. E. C. Jorgensen, J. A. Bassham, M. Calvin, and B. M. Tolbert. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2418-2419.

9424 Synthesis of 2,4-Dichlorophenoxyacetic Acid Labeled With Isotopic Carbon. Melvin Fields, Seymour Rothchild, and Morris A. Leaffer. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2435-2436.

9425 Synthesis of Radioactive Iodine^{131} Analog of DDT. Jens A. Jensen and George W. Pearce. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2436.

9426 A Synthesis of Formaldehyde-C^{14}. A. R. Jones and W. J. Skraba. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2437-2438.

9427 A Method for the Synthesis of High Specific Activity Benzene-C^{14}. Robert J. Speer, Mary L. Humphries, and Ammarette Roberts. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2443-2444.

9428 Some Catalytic Exchange and Hydrogenation Reactions of Acetylene and Ethylene. John E. Douglas and B. S. Rabinovitch. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2486-2489.

Analyzes results of a series of experiments on the above. 15 ref.

9429 The Disproportionation of Paraffins Dissolved in Isobutane Catalyzed by Aluminum Chloride and Hydrogen Chloride. Abraham Schneider. *Journal of the American Chemical Society*, v. 74, May 20, 1952, p. 2553-2557.

16 references.

9430* Isomers of Linoleic Acid. Infrared and Ultraviolet Properties of Methyl Esters. John E. Jackson, Raymond F. Paschke, Wesley Tolberg, Harold M. Boyd, and Donald H. Wheeler. *Journal of the American Oil Chemists' Society*, v. 29, June 1952, p. 229-234.

Describes above including reference to interpretation of spectral analyses for linoleate in natural oils. Graphs and tables. 18 ref.

9431* Nonionic Surfactants Derived From a New Hydrophobic Base. Thomas H. Vaughn, Donald R. Jackson, and Lester G. Lundsted. *Journal of the American Oil Chemists' Society*, v. 29, June 1952, p. 240-243.

A versatile new class of nonionic surfactants was prepared essentially from ethylene and propylene oxides which range in physical form from liquids to solids sufficiently hard to flake. Extensive tailoring of the products is possible to give specific control of properties such as solubility in water, detergency, wetting action, and surface-tension lowering. Table and graphs.

9432* Preparation of Methyl Linoleate Hydroperoxide. K. T. Zilch, H. J. Dutton, and J. C. Cowan. *Journal of the American Oil Chemists' Society*, v. 29, June 1952, p. 244-246. Graph and tables.

9433 Polarographic Studies of Oxygen-Containing Organic Compounds; Functional Groups of Autoxidation Products. C. O. Willits, Constantine Ricciuti, H. B. Knight, and Daniel Swern. *Analytical Chemistry*, v. 24, May 1952, p. 785-790.

Use of a nonaqueous electrolytic solution made it possible to study and compare polarographic behavior of the above. Polarographic characteristics of 41 oxygen-containing compounds whose functional groups have either been detected or suspected of occuring in autoxidation reaction mixtures are described. 17 ref.

9434 Precision Semimicro Hydrogenation Apparatus. F. A. Vandenheuvel. *Analytical Chemistry*, v. 24, May 1952, p. 847-851.

No apparatus described in the literature allowed the determination of hydrogenation values with a precision better than 1%, as well as precise study of catalytic hydrogenation rates under fully isobaric and thermostatic conditions, with semimicro and micro quantities. The new apparatus described and diagrammed allows such studies to be made. Its features overcome the drawbacks of hydrogenation apparatus in general, and allow good control of conditions and easy manipulation. Precision is about 0.3% for one determination of unsaturation value involving a few mg. of unsaturated compound.

9435* Characteristics and Importance of Free Radicals. (In German.) *Angewandte Chemie*, v. 64, May 1952, p. 233-247.

Review of literature on above is followed by consideration of characteristics of free radicals from the standpoint of modern electron theory. Photographs, tables, and numerous references.

9436 Extraction of Polyhydroxy Compounds From Dilute Aqueous Solutions by Cyclic Acetal Formation. IV. Recovery of n-Butyraldehide. J. M. Roxburgh. *Canadian Journal of Technology*, v. 30, Apr. 1952, p. 72-81.

Graphs and tables. 10 ref.

9437 Dicumarol-2-C^{14}: Synthesis and Metabolism Studies. H. R. Eisenhauer, J. M. Pepper, L. B. Jaques, and J. W. T. Spinks. *Canadian Journal of Chemistry*, v. 30, Apr. 1952, p. 245-250.

Starting with $BaC^{14}O_3$, diethyl carbonate-1-C^{14} and 4-hydroxycoumarin-2-C^{14} were prepared. Subsequent reaction of the latter compound with aqueous HCHO yielded the desired compound. Metabolism studies made on a mouse indicate that the 2-carbon of dicumarol does not enter into a metabolic process whereby it is expired as CO_2. 10 ref.

9438 Preparation of Ketene From Glacial Acetic Acid, Methyl Acetate, and Ethyl Acetate. K. K. Georgieff. *Canadian Journal of Chemistry*, v. 30, Apr. 1952, p. 332-347.

Apparatus diagram, graphs, and tables.

9439* The Strecker Degradation of α-Amino Acids. Alexander Schönberg and Radwan Moubacher. *Chemical Reviews*, v. 50, Apr. 1952, p. 261-277.

Tables and 53 ref.

9440* Some Aspects of the Organic Chemistry of Selenium. Tod W. Campbell, Howard G. Walker, and Galvin M. Coppinger. *Chemical Reviews*, v. 50, Apr. 1952, p. 279-349.

Includes analysis, evaluation of methods of synthesis, physical properties, and theoretical chemical aspects of organoselenium compounds. Tables and 357 ref.

9441* The Isomerisation of p-Xylene. G. Baddeley, G. Holt, and D. Voss. *Journal of the Chemical Society*, Jan. 1952, p. 100-105.

Presence of a third component such as a hydrogen halide is shown to be an essential feature of the interaction of an aromatic hydrocarbon and an aluminium halide at room temperature.

9442* Examples of the Direct Iodination of Aromatic Compounds. I. R. L. Barker and William A. Waters. *Journal of the Chemical Society*, Jan. 1952, p. 150-153.

Examples are given of the above reaction by treatment with

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iodine in the presence of silver sulfate dissolved in concentrated H_2SO_4. Iodination of C_6H_6 and naphthalene are also considered.

9443* Organic Fluorides. Part XI. Fluorination of Heterocyclic Compounds with Cobalt Trifluoride. R. Montgomery and F. Smith. *Journal of the Chemical Society*, Jan. 1952, p. 258-259.

Shows that the principal reaction in the fluorination of compounds containing N_2, O_2, or S is one of fission with the elimination of these elements and the fluorination of the hydrocarbon fragments. Extent of this degradation is dependent upon the method of fluorination and appears to be capable of modification by a preliminary stabilization by chlorination.

9444* Electron Distribution in Conjugated Free Radicals. Juliane Jacobs. *Journal of the Chemical Society*, Feb. 1952, p. 292-298.

In the two systems $CH_{3-x}Ph_x$ and $CH_{3-x}(C_6H_4Ph)_x$, free-valence numbers are deduced from an investigation of bond orders as defined in the molecular-orbital theory. Corresponding quantities arising in certain p-benzoquinone dimethides are also reported. On the basis of these data, changes in aromatic character under increasing phenylation are observed and diradical behavior of certain meriquinones is discussed. The results are correlated with predictions of reactivity ascribed to the presence of free electrons.

9445* The Kinetics of the Thermal Decomposition of Olefins. Part II. M. J. Molera and F. J. Stubbs. *Journal of the Chemical Society*, Feb. 1952, p. 381-391.

Comparative study of the thermal decomposition of the following olefins in a static system: but-1-ene, pent-1-ene, hex-1-ene, hept-1-ene, but-2-ene, isobutene, 2-methylbut-1-ene, 3-methylbut-1-ene.

9446* Reactions of Aromatic Nitro-Compounds With Alkaline Sulphides. Part IV. Disulphide Formation. E. R. Ward and L. A. Day. *Journal of the Chemical Society*, Feb. 1952, p. 398-400.

9447* Solutions of Alcohols in Non-Polar Solvents. Part II. Volume Relations in Dilute Solutions of Primary Alcohols in Benzene, Heptane, and Cyclohexane. L. A. K. Staveley and Betty Spice. *Journal of the Chemical Society*, Feb. 1952, p. 406-414.

An apparatus is described for accurate determination of the small volume changes which occur when one liquid is mixed with a much larger quantity of another. Measurements were made at 20°C. of volume changes occurring when the above compounds are mixed.

9448* A Thermochemical Evaluation of Bond Strengths in Some Carbon Compounds. Part II. Bond Strengths Based on the Reaction $CH_3I+HI \rightarrow CH_4+I_2$. R. J. Nichol and A. R. Ubbelohde. *Journal of the Chemical Society*, Feb. 1952, p. 415-421.

Previous methods described for constant-pressure calorimetry for studying heat changes in Grignard reactions were modified by use of carefully selected solvents and by design of the reaction vessel.

9449* Influence of Ion Exchange on Optical Properties, Shape, and Elasticity of Fully-Swollen Alginate Fibres. J. L. Mongar and A. Wassermann. *Journal of the Chemical Society*, Feb. 1952, p. 500-510.

9450* Heat Effects Accompanying the Absorption of Simple Electrolytes by Fully-Swollen Alginate and Cellulose Gels. A New Microcalorimetric Method. I. L. Mongar and A. Wassermann. *Journal of the Chemical Society*, Feb. 1952, p. 510-513.

A microcalorimetric method is described which enables determination of small heat effects accompanying interaction of fully-swollen gels with solutions of permeant electrolytes.

9451* Physical Properties and Chemical Constitution. Part XXIV. Aliphatic Aldoximes, Ketoximes, and Ketoxime o-Alkyl Ethers, NN-Dialkylhydrazines, Aliphatic Ketazines, Mono- and Dialkylaminopropionitriles, Alkoxypropionitriles, Dialkyl Azodiformates, and Dialkyl Carbonates. Bond Parachors, Bond Refractions, and Bond-Refraction Coefficients. Arthur I. Vogel, William T. Cresswell, George H. Jeffrey, and James Leicester. *Journal of the Chemistry Society*, Feb. 1952, p. 514-549.

Numerous detailed tables and charts.

9452* The Catalytic Deuteration of Organic Compounds. Part I. Deutration and Disproportionation. Part II. The Deuteration of Cholesterol and Ergosterol. J. Bell and S. J. Thomson. *Journal of the Chemical Society*, Feb. 1952, p. 572-580.

9453* The Comparative Ease of Oxidation of Various Ethers in the Gaseous Phase. T. A. Eastwood and Cyril Hinshelwood. *Journal of the Chemical Society*, Feb. 1952, p. 733-738.

A comparative study was made of the reactions of a series of ethers with gaseous O_2. The general position of the areas of cool flame, ignition, and slow reaction were mapped for these ethers.

9454* Hydrolytic Decomposition of Esters of Nitric Acid. Part I. General Experimental Techniques. Alkaline Hydrolysis and Neutral Solvolysis of Methyl, Ethyl, isopropyl, and tert.-Butyl Nitrates in Aqueous Alcohol. Part II. The Effects of Structural and Solvent Changes on the Substitution and Elimination Reactions Which Occur in the Hydrolysis of Primary, Secondary, and Tetiary Alkyl Nitrates. John W. Baker and D. M. Easty. *Journal of the Chemical Society*, Apr. 1952, p. 1193-1216.

9455* The Reactions of Highly Fluorinated Organic Compounds. Part I. The Preparation and Reactions of Some Chlorundecafluorocyclohexanes. J. C. Tatlow and R. E. Worthington. *Journal of the Chemical Society*, Apr. 1952, p. 1251-1257.

9456* Substituted Benzidines and Related Compounds as Reagents in Analytical Chemistry. Part IX. Naphthidine- and 3:3′-Dimethylnaphthidine-Sulphonic Acids as New Redox Indicators. R. Belcher, A. J. Nutten, and W. I. Stephen. *Journal of the Chemical Society*, Apr. 1952, p. 1269-1274.

Sulfonic acid derivatives of naphthidine and 3:3′-dimethylnaphthidine were prepared, and their properties as indicators examined in the titration of Cd and Zn with ferrocyanide, ferrous salts with dichromate and with ceric sulfate, and vanadic acid with ferrous salts.

9457* The Preparation and Properties of Some Hydrocarbons with Recurrent Groups. S. F. Birch, V. E. Gripp, D. T. McAllan, and W. S. Nathan. *Journal of the Chemical Society*, Apr. 1952, p. 1363-1368.

Six hydrocarbons of high molecular weight, with methyl, tetramethylene, and pentamethylene substituent groups attached to a paraffin chain were prepared from the corresponding long-chain dicarboxylic esters via the glycols and dibromides. Physical properties are described.

9458* Isotopic Tracer Studies of Pyrolytic Reactions. Part I. The Formation of Acetaldehyde. J. Bell and R. I. Reed. *Journal of the Chemical Society*, Apr. 1952, p. 1383-1389.

Study of the formation of CH_3CHO by the pyrolysis of a mixture of barium acetate and barium formate using an isotopic-tracer technique.

9459* Fission of Mixed Ethers by Boron Trichloride. W. Gerrard and M. F. Lappert. *Journal of the Chemical Society*, Apr. 1952, p. 1486-1490.

Results of above are compared with those from ether fission by hydrogen iodide.

9460* Synthesis of Alkylarylsulfonates as Growth-Promoting Substances. (In German.) A. v. Segesser and H. Stüpel. *Chimia*, v. 6, Apr. 1952, p. 84-86.

Literature review of synthesis procedures. 38 ref.

9461 Electro-Organic Chemical Preparations. IV. Sherlock Swann, Jr. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 219-226.

An extension of previous lists of electro-organic syntheses. The review has been extended to papers covered in *Chemical Abstracts* and unpublished work in dissertations up to Jan. 1950. Numerous errors in previous articles are listed.

9462 Polarographic Behavior of Organic Compounds. XI. The 2-Bromo-n-Alkanoic Acids. Influence of Substitution on Carbon-Halogen Bond Fission. Isadore Rosenthal, Charles H. Albright, and Philip J. Elving. *Journal of the Electrochemical Society*, v. 99, June 1952, p. 227-233.

12 references.

9463 Hydrogen Exchange Between Deuterium Oxide and Hydrocarbons on Silica-Alumina Catalyst. R. C. Hansford, P. G. Waldo, L. C. Drake, and R. E. Honig. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1108-1113.

Data previously presented suggested that interaction of a hydrocarbon with a cracking catalyst involves formation of an ionic complex, the reactions of which can account for the products of catalytic cracking. The present paper presents a more quantitative study of the exchange reaction, and relates mechanism of the reaction to the generally accepted ionic theory of catalytic cracking. 15 ref.

9464* A New Synthesis of Formamidine. D. J. Brown. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 202-203.

By action of Raney nickel on thiourea.

9465* Organic Fluorides. XII. A Simple Rotating Reactor For Fluorination. W. E. Massingham, R. Montgomery, F. Smith, and B. R. J. Thomas. *Journal of Applied Chemistry*, v. 2, Apr. 1952, p. 221-224.

Described and diagrammed. Application to fluorination of petroleum ether is described and its greater efficiency as compared with the static vertical reactor is demonstrated.

9466 The Behavior of Metal Complexes in Aqueous Solutions. Arthur E. Martell. *Journal of Chemical Education*, v. 29, June 1952, p. 270-280.

Surveys ways in which properties of aqueous metal ions are affected by complex formation, with special reference to the formation of chelate compounds. Topics discussed are solubility, electrical conductance, interaction with hydrogen ions, absorption spectra, and oxidation potential. Graphs, diagrams, and tables. 39 ref.

9467 Kinetics of the Decomposition of Diethyl Peroxide. Richard E. Rebbert and Keith J. Laidler. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 574-577.

Apparatus diagram, graph, and tables. 15 ref.

9468 The Reaction of Methyl Radicals With Some Halogenated Methanes. F. A. Real and E. W. R. Steacie. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 578-581.

Tables and graphs.

9469 The Reaction of Methyl Radicals With Nitric Oxide, and the Rate of Combination of Methyl Radicals. R. W. Durham and E. W. R. Steacie. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 582-585.

A study on the above using radioactive tellurium mirrors. Graphs and tables. 12 ref.

9470 The Azomethane Induced Oxidation of Propane. Milton D. Scheer and H. Austin Taylor. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 653-657.

A study of the effect of introducing methyl radicals into a C_2H_6-O_2 mixture. In particular, the region of onset of cool flames in propane oxidation was studied. Graphs and tables. 14 ref.

9471 A Molecular Orbital Theory of Reactivity in Aromatic Hydrocarbons. Kenichi Fukui, Teijiro Yonezawa, and Haruo Shingu. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 722-725.

Concludes that distinct from other π-electrons, the pair of π-electrons occupying the highest orbital, which are referred to as frontier electrons, play a decisive role in chemical activation of the hydrocarbon molecules studied. Tables. 18 ref.

9472 The Application of the Hammett Equation to the Dissociation of Aromatic Free Radicals. Newton Schwartz and Wayne K. Wilmarth. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 748-749.

Table and graph.

9473 Free Radicals By Mass Spectrometry. I. The Measurement of Methyl Radical Concentrations. F. P. Lossing and A. W. Tickner. *Journal of Chemical Physics*, v. 20, May 1952, p. 907-914.

Method for measuring partial pressure of CH_3 radicals in thermally decomposing gases, using a modified mass spectrometer. Sensitivity to methyl radicals was determined by decomposing known quantities of mercury dimethyl and di-t-butyl peroxide in a stream of carrier gas and measuring amounts of stable products and net height of the mass-15 peak after correction for contributions from these stable products. 14 ref.

9474 The Reactivity of Dibenzoselenophene. Ng. Ph. Buu-Hoï and Ng. Hoán. *Journal of Organic Chemistry*, v. 17, May 1952, p. 643-647.

The behavior of dibenzoselenophene in Friedel-Crafts reactions with some acid chlorides was investigated, and several N-containing derivatives prepared. 17 ref.

9475 Factors Influencing the Course and Mechanism of Grignard Reactions. XX. The Cleavage of Ethers by Grignard Reagents in the Presence of Cobaltous Halides. M. S. Kharasch and R. L. Huang. *Journal of Organic Chemistry*, v. 17, May 1952, p. 669-677.

9476 A New Reaction of Olefins, Nitriles, and Halogens. T. L. Cairns, P. J. Graham, P. L. Barrick, and R. S. Schreiber. *Journal of Organic Chemistry*, v. 17, May 1952, p. 751-757.

Describes above 3-component reaction to give an imide chloride that can be hydrolyzed to an N-(2-chloroalkyl) amide. Found to be a general reaction applicable to aromatic and aliphatic nitriles and HCN in combination with such olefins as ethylene, cyclohexene, 1-octene, and styrene. Tables. 19 ref.

9477* The Practical Possibilities of Ion Exchange. Part 3. Ion Exchange in the Organic, Biochemical and Medical Fields. T. R. E. Kressman. *Manufacturing Chemist and Manufacturing Perfumer*, v. 23, May 1952, p. 194-197.

75 references.

9478 Synthesis of D-Glucose-1-C^{14} and D-Mannose-1-C^{14}. H. S. Isbell, J. V. Karabinos, H. L. Frush, N. B. Holt, A. Schwebel, and T. T. Galkowski. *Journal of Research of the National* Bureau of Standards, v. 48, Mar. 1952, p. 163-171.

Reports an improved cyanohydrin synthesis of the above, with yields of about 50%. Tables and apparatus diagram. 23 ref.

9479 Recent Soviet Pronouncements on Molecular Structure. A. E. Stubbs. *Nature*, v. 169, May 24, 1952, p. 860-863.

Presents information relevant to above for organic chemistry, obtained from recent Russian papers and conference reports. 12 ref.

9480* Pressure-Volume-Temperature Properties of the Freon Compounds. B. J. Eiseman, Jr. *Refrigerating Engineering*, v. 60, May 1952, p. 496-503.

A series of generalized graphs which can be used to estimate P-V-T properties of halogenated hydrocarbons in both the saturated and superheat regions, when experimental data are not available. 10 ref.

9481 The Role of Formaldehyde in the Oxidation of Ethylene. A. J. Harding and R. G. W. Norrish. *Proceedings of the Royal Society*, ser. A, v. 212, May 7, 1952, p. 291-311.

Oxidation of C_2H_4 at temperatures in the 400°C. region was studied manometrically and analytically, and compared with oxidation of HCHO under similar conditions. A reaction scheme which accounts satisfactorily for observed facts was developed. Numerous graphs. 21 ref.

9482* Contribution to the Study of Raney Nickel. (In French.) **1. Production of Catalysts With Maximum Activity. 2. Selective Hydrogenation of α-β-Ethyl Ketones by Nickel Inhibited by Free Hydrochloric Acid, Accelerated by Chloroform, or Inhibited by Carbon Dioxide.** R. Cornubert and Jean Phélisse. **3. New Research on the Hydrogenation of Ethyl Ketones; Catalysts Inhibited by Various Chlorine Compounds, and by Oxidized Nickels.** R. Cornubert and Max Real. **4. New Research on the Selective Hydrogenation of α-β-Ethyl Ketones.** R. Cornubert and C. Kaziz. *Bulle-*

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tin de la Société Chimique de France, Mar.-Apr. 1952, p. 399-413.

69 references.

9483* Formation of Silicon-Organic Compounds. Report 1. Reactions Between Ethylene and Silicon-Hydrogen Compounds. (In German.) G. Fritz. *Zeitschrift für Naturforschung*, v. 7b, Apr. 1952, p. 207-216.

20 references.

9484* Photoreactions of Iodo-Organic Compounds. (In Russian.) G. A. Razuvaev and M. A. Shubenko. *Zhurnal Obshchei Khimii*, v. 21(83), Nov. 1951, p. 1974-1979.

A study was made of the photochemical reactions of mercury-organic compounds with iodine derivatives in alcohol and benzene solutions. Results are discussed.

9485* The Hypothesis of Quasicomplex States and Allied Problems in the Theory of Organic Transformations. (In Russian.) E. A. Shilov. *Zhurnal Obshchei Khimii*, v. 21(83), Nov. 1951, p. 2084-2093.

The above are discussed in detail. 20 ref.

9486* Isomerization of Polymethylene Hydrocarbons Under the Influence of Aluminum Chloride. XVII. Isomerization of Methylcyclohexane, 1,1-Dimethylcyclohexane, 1,2-Dimethylcyclohexane, and Ethylcyclohexane. (In Russian.) N. D. Zelinskii, M. B. Turova-Poliak, N. F. Tsvetkova, and E. G. Treshchova. *Zhurnal Obshchei Khimii*, v. 21(83), Dec. 1951, p. 2156-2160.

9487* Some New Data Concerning Isomerization of Cyclohexane by Aluminium Chloride. (In Russian.) N. D. Zelinskii, M. B. Turova-Poliak, N. F. Tsvetkova, and E. G. Treshchova. Zhurnal Obshchei Khimii, v. 21(83), Dec. 1951, p. 2160-2163.

Books

9488 The Terpenes. Vol. III. The Sesquitrepenes, Diterpenes and Their Derivatives. John Simonsen and D. H. R. Barton. 575 pages. 1952. Cambridge University Press, London. (QD416 Si56t2)

See also:

9349 (carbonium-ion reactions)
9505 (alcoholysis of polyesters; rearylization of diarylalkylenes)
9591 (polymerization and structure of drying oils)

28. PLASTICS AND HIGH POLYMERS

9489* The Polyamide Formed by Polycondensation of Octadecanoic Acid-9,10-Diol with Hexane-1,6,-Diamine. (In French.) Kanji G. Ashar and Georges Champetier. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 7, 1952, p. 1555-1557.

Variation of the intrinsic viscosity of the above, as a function of duration of the polycondensation at 200°C., shows existence of a secondary reaction due to formation of bridges between the chains of the polyamide. The change of direction of the curve makes it possible to detect the beginning of the formation of these intermolecular bonds.

9490* Effect of Velocity on Tensile Impact Properties of Polymethyl Methacrylate. Bryce Maxwell and J. P. Harrington. *Transactions of the American Society of Mechanical Engineers*, v. 74, May 1952, p. 579-586; disc., p. 586-587.

Current theories of impact resistance are discussed. Effect of velocity on energy absorbed by polymethyl methacrylate at various temperatures was studied with the aid of two new testing machines. Results are interpreted in terms of classical theories of mechanics of materials and current theories of rheology of high polymers. 14 ref.

9491 ASTM Definitions of Terms Relating to Methods of Testing. *ASTM Bulletin*, May 1952, p. 66-69; disc., p. 69-70.

Includes an introduction by P. G. McVetty; and definitions of terms and symbols relating to tension testing of plastics. Latter proposed as revision of definitions appearing in Methods D-638. Graphs.

9492 Seven Steps in Making a Plastic Body. *Automotive Industries*, v. 106, May 15, 1952, p. 46-47.

Picture story of fabrication of first low-cost plastic automobile body to go into commercial production. This unit is constructed of Vibrin polyester, a product of the U. S. Rubber Co.'s Naugatuck Div.; and layers of glass fiber. Glasspar Co. of Costa Mesa, Calif., is making the body in one design which fits a chassis with a 100-in. wheelbase.

9493* Plastic Aircraft Development Nears Goal. W. F. Bradley. *Automotive Industries*, v. 106, June 1, 1952, p. 48-49, 88.

Outstanding in the plastics section of the British Industries Fair, held in London last month, was a full sized delta-shaped plastic wing of highly polished molded plastic. This is the first step towards the all-plastic aircraft which promises to cut manufacturing costs 50-80% compared with conventional construction.

9494 Carbanionic Copolymerization Studies. Frederick C. Foster. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2299-2307.

Relative reactivity ratios were determined for carbanionic polymerization of vinyl butyl sulfone-acrylonitrile catalyzed by Na in liquid NH_3. Similar data were obtained on the carbanionic copolymerization of styrene-acrylonitrile and methyl methacrylate-acrylonitrile; however, reactivity ratios could not be determined. 12 ref.

9495 New Printing and Coating Technique For Rigid Sheet. *British Plastics*, v. 25, May 1952, p. 142-145.

New method of treating plastics sheeting, which can be adapted to integral printing, laminating by fusion, surface decorating, and embossing, is now being carried out on a commercial scale. Acrylic, polystyrene, vinyl, and vinyl copolymer sheeting can all be treated by this technique. Fundamentally the process consists of applying inks or coating compounds which are based on partially polymerized monomer materials, to a plastics sheet with which they are compatible; the print or coating is then fused and polymerized with the sheet in a hydraulic press.

9496 Brake Lining Manufacture. Harold Beever. *British Plastics*, v. 25, May 1952, p. 146-150.

Describes and illustrates procedures and equipment. Discusses plastic or resinous materials used.

9497 An Instrument For Determining the Setting Time of Hot-Press Adhesives. N. A. de Bryune. *British Plastics*, v. 25, May 1952, p. 156-159.

Describes, diagrams, and illustrates above apparatus. Test data for a series of adhesive combinations are tabulated and charted.

9498 The Place of Plastics in the Order of Matter. J. J. P. Staudinger. *British Plastics*, v. 25, May 1952, p. 160-164.

A lecture. Relates plastics to metals, glasses, ceramics, etc., with respect to molecular structure, chemistry, and physical properties. Discusses substitution of plastics for metals.

9499 Expanded Plastics in the Tropics. *British Plastics*, v. 25, May 1952, p. 165.

Expanded polystyrene, expanded p.v.c., cellular urea formaldehyde, expanded polyvinyl formal, expanded cellulose acetate, and expanded phenolic material were exposed for 6 mos. to rain and insect attack in dense jungle undergrowth. Results are briefly outlined.

9500* The Kinetics of Catalytic Polymerizations. Part I. The Polymerization of Styrene Catalyzed by Aluminium Chloride in Carbon Tetrachloride Solution. Part II. The Mechanism of the Polymerization of Styrene Catalyzed by Aluminium Chloride. D. O. Jordan and A. R. Mathieson. *Journal of the Chemical Society*, Feb. 1952, p. 611-626.

9501* Anionic Polymerisation. Part I. The Polymerisation of Styrene in Liquid Ammonia Solution Catalyzed by Potassium Amide. W. C. E. Higginson and N. S. Wooding. **Part II. The Acid-Base Character of Anionic Polymerisation.** N. S. Wooding and W. C. E. Higginson. *Journal of the Chemical Society*, Mar. 1952, p. 760-779.

Part I confirms the mechanism previously suggested for the above. Part II is a qualitative survey of reactivity of various anion bases in initiating the polymerization of vinyl monomers in liquid NH_3 and in diethyl ether.

9502 Synthetic Resins For Industrial Finishes. Part II. Systems Containing Alkyd Resins. William von Fischer. *Finish*, v. 9, June 1952, p. 31-34, 76-79.

Production, properties, and applications of the various types.

9503* Anionic Polymerisation. Part III. The Polymerisation of Styrene in Liquid Ammonia Catalysed by Potassium. N. S. Wooding and W. C. E. Higginson. *Journal of the Chemical Society*, Mar. 1952, p. 1178-1800.

Dependence of rate of monomer disappearance and of molecular weight upon reactant concentrations and upon temperatures for the above reaction was established.

9504* Characterization of Fractionated Polyvinyl Alcohols. (In German.) K. Dialer, K. Vogler, and F. Patat. *Helvetica Chimica Acta*, v. 35, no. 3, 1952, p. 869-885.

Four selected fractions of polyvinyl alcohol were investigated by viscosity, sedimentation, and diffusion measurements. The concentration dependance of these values agrees with well-known formulas. Homogeneity of these fractions is characterized by means of sedimentation photographs. Results are evaluated supporting the validity of more modern theories. Charts, graphs, tables, and photographs. 45 ref.

9505* High-Molecular Weight Compounds. (In Russian.) **Part 41. Alcoholysis of Polyesters.** V. V. Korshak and S. V. Vinogradova. **Part 42. Rearylization of Diarylalkylenes.** G. S. Kolesnikov and V. V. Korshak. *Izvestiia Akademii Nauk SSSR*, Section of Chemical Sciences, Nov.-Dec. 1951, p. 756-770.

In Part 41, alcoholysis of polyhexamethylsebacate was studied; and, in Part 42, syntheses of 1,3-diphenylpropane, 1,2-diphenylethane, 1,4-diphenylpropane, and 1,4-diphenylbutane, and 1,4-diphenylbutane, were studied. Reactions are discussed. 22 ref.

9506* Extrusion of Cellulose Acetate and Cellulose Acetate Butyrate. E. C. Blackard. *India Rubber World*, v. 126, May 1952, p. 233-237.

9507 Pigment Colors For Plasticized Vinyl Chloride Polymers. George Wormald and W. F. Spengeman. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1104-1107.

Simplified classification from the chemical viewpoint. Suitability of various types of colors for pigmenting vinyl polymers.

9508 Oxidation of General-Purpose Polyethylene Resin. C. S. Myers. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1095-1098.

Presents quantitative data on dielectric-loss properties and corresponding chemical effects caused by thermal oxidation which permit a definition of the kinetics of the oxidation reaction. 18 ref.

9509 Flow Birefringence in Polydisperse Systems of Rod-Like Molecules Having a Montroll-Simha Distribution. Martin Goldstein. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 677-682.

Theoretical, mathematical treatment. Graphs and table. 12 ref.

9510 Specific Heat of Synthetic High Polymers. I. A. Study of Polyethylene Including a Statistical Theory of Crystallite Length. Malcolm Dole, W. P. Hettinger, Jr., N. R. Larson, and J. A. Wethington, Jr. *Journal of Chemical Physics*, v. 20, May 1952, p. 781-790.

Data are given for specific heat of granular, sheet, annealed, and drawn samples of polyethylene from −20 to 200°C. From the data, changes in enthalpy and entropy between these temperatures were calculated and an estimate made of free energy of the cold-drawing process. The percentage of crystallinity calculated from the enthalpy is given as a function of temperature and compared with similar estimates from x-ray and density measurements. Applicability of Flory's theory of crystallization in high polymers to the data is studied. A new statistical treatment of crystallite-length distribution is presented. 18 ref.

9511 Statistical Mechanics of Dilute Polymer Solutions. III. Ternary Mixtures of Two Polymers and a Solvent. W. R. Krigbaum and P. J. Flory. *Journal of Chemical Physics*, v. 20, May 1952, p. 873-876.

Expressions are derived for osmotic pressure and turbidity of a dilute solution of two chemically dissimilar polymer species in a solvent. The relations obtained are contrasted with those derived by use of free energy of mixing as given by the quasi-crystalline lattice model. Use of equations based on the lattice model to evaluate polymer-polymer interaction parameters from dilute-solution data is shown to be valid only in special instances.

9512* The Influence of Differences in Molecular Size on the Surface Tension of Solutions. IV. I. Prigogine and J. Marechal. *Journal of Colloid Science*, v. 7, Apr. 1952, p. 122-127.

Presents a statistical calculation for a simplified model, and a quantitative discussion of the surface tension of polymer solutions.

9513* Study of the Mechanism of Ionic Polymerization Using Radioactive Tracers. R. O. Colclough. *Journal of Polymer Science*, v. 8, May 1952, p. 467-475.

A study of the ionic polymerization of styrene using antimony pentachloride containing radioactive Sb as the catalyst shows that, contrary to earlier work, no catalyst remains attached to the polymer chain. Apparatus diagram and tables.

9514* Size and Shape of the Molecules in Artificially Branched Polystyrene. Carl D. Thurmond and Bruno H. Zimm. *Journal of Polymer Science*, v. 8, May 1952, p. 477-494.

Relations between size, intrinsic viscosity, and molecular weight were compared for fractionated DVB-styrene copolymer and pure polystyrene. Results of the study are useful in semiquantitative determination of branching. Tables and graphs. 11 ref.

9515* Vinyl-Type Polymers Containing Phosphorus. C. S. Marvel and John C. Wright. *Journal of Polymer Science*, v. 8, May 1952, p. 495-502.

Describes preparation of the above through introduction of hydroxyphosphoric acid residue into some copolymers. Some have flame resistance. Tables.

9516* The Effect of Chemical Composition on Selected Physical Properties of Linear Polymers. E. F. Izard. *Journal of Polymer Science*, v. 8, May 1952, p. 503-518.

A survey, together with new data. Primarily concerned with homologous series of condensation polymers and the effect of hydrocarbon content and polarity of modifying groups on melting point. Shows that polymer series go through a eutectic region. Tables and graphs. 18 ref.

9517* Rates of Initiation in Vinyl Polymerization. Bahattin Baysal and Arthur V. Tobolsky. *Journal of Polymer Science*, v. 8, May 1952, p. 529-541.

Above determined for styrene and methyl methylmethacrylate for 4 different catalysts. Gives catalyst efficiencies and chain-transfer constants. Discusses photopolymerization. Tables and graphs. 19 ref.

9518* Elastoviscous Properties of Polyisobutylene. V. The Transition Region. A. V. Tobolsky and J. R. McLoughlin. *Journal of Polymer Science*, v. 8, May 1952, p. 543-553.

Discusses principles for the extension of the time scale for elastoviscous data by use of experimental information obtained at various temperatures. The complete composite relaxation curve for polyisobutylene and polymethyl methacrylate are given. The former is shown to have 3 regions. Graphs and tables. 12 ref.

9519* Study of Degradation of Polystyrene by Means of Mass Spectrometry. B. G. Achhammer, M. J. Reiney, L. A. Wall, and F. W. Reinhart. *Journal of Polymer Science*, v. 8, May 1952, p. 555-571.

Degradation was by heat and/or ultraviolet radiation. Oxygen content, discoloration, and insolubility were also studied. Degradation involves 2 processes: the breakdown of thermolabile groups formed prior to treatment; and oxidation of the polymer. Apparatus diagrams, graphs, and photograph. 13 ref.

9520* Thermal Degradation of Polystyrene in Solution. H. H. G. Jellinek and L. B. Spencer. *Journal of Polymer Science*, v. 8, May 1952, p. 573-574.

A study of 3% solutions of fractionated polystyrene in tetralin and in naphthalene.

28. *Plastics and High Polymers*

9521* Behavior of Linear Polymers in Solution. Akira Isihara. *Journal of Polymer Science*, v. 8, May 1952, p. 574-576.
Theoretical and mathematical.

9522* Copolymerization Characteristics of Fumaronitrile. Charles C. Price and Richard D. Gilbert. *Journal of Polymer Science*, v. 8, June 1952, p. 577-581.
The copolymerization of fumaronitrile with styrene is discussed along with added data on its copolymerization with methyl methacrylate. Tables.

9523* Structure of Neoprene. V. Viscosity-Conversion Relationships in Sulfur-Modified Polychloroprenes. W. E. Mochel. *Journal of Polymer Science*, v. 8, June 1952, p. 583-592.
Discusses measurement of sol:gel ratios and intrinsic viscosities of polymers isolated at different conversions. A study of solution properties as functions of conversion was undertaken for above polychloroprenes. 13 ref.

9524* Control of Dust in Solutions for Turbidimetry. Carl D. Thurmond. *Journal of Polymer Science*, v. 8, June 1952, p. 607-609.
Tells how dust-free polymer solutions are prepared with the aid of special equipment which is described and diagrammed.

9525* A New Tool for Determination of the Stage of Polymerization of Thermosetting Polymers. George A. Sofer and Ernst A. Hauser. *Journal of Polymer Science*, v. 8, June 1952, p. 611-620.
Study of the change of attenuation and velocity of longitudinal ultrasonic waves with cure of thermosetting plastics. Ultrasonic equipment used is described in detail. Numerous graphs and diagrams.

9526* Effect of the Velocity Gradient on Intrinsic Viscosity of Polymers in Solution. A. Peterlin. *Journal of Polymer Science*, v. 8, June 1952, p. 621-632.
Soft and stiff molecules and semipermeable coils are discussed mathematically in relation to the above.

9527* Viscosity—Molecular Weight Relation for Polymethacrylic Acid in Methanol. Norman M. Wiederhorn and Alice R. Brown. *Journal of Polymer Science*, v. 8, June 1952, p. 651-656.
Describes recent experiments on above in detail. Tables and graphs.

9528* Presses, Multilayer Presses, Injection Presses, Tablet Presses. (In German.) H. Draeger. *Kunststoffe*, v. 42, Apr. 1952, p. 82-89.
Discusses and illustrates a variety of methods and machines for pressing and molding plastic materials.

9529* Worm-Feed Presses. (In German.) Erich Escales. *Kunststoffe*, v. 42, Apr. 1952, p. 97-105.
Discusses design and construction of worm-feed and compression presses for plastics giving specifications for different designs.

9530* Fabricated Plastics in the Plating Industry. Raymond B. Seymour and Earl A. Erich. *Metal Finishing*, v. 50, June 1952, p. 117-119.
Considers uses and techniques of application of fabricated plastic linings to various metal objects, such as tanks, pipe, hoods, ducts, and ventilating equipment. Also discusses welding of plastics. Tables gives physical and chemical properties of 10 common plastic materials.

9531* Joining of Metals to Each Other or to Other Materials. (In German.) K. Meyerhans. *Metall*, v. 6, May 1952, p. 229-240.
Reviews the possibilities of joining metals by means of organic binding agents, particularly pressure-setting agents. Examples of the use of such plastics for various tasks in industry are outlined. Their advantages, and properties of the bonds, are indicated. Tables, diagrams, and photographs.

9532 New Casting Resin Used For Low Cost Forming Tools. John Starr. *Materials & Methods*, v. 35, May 1952, p. 105-107.
Unusual phenolformaldehyde casting resin is produced as an A-stage phenolic liquid by Baker Oil Tools, Inc., Los Angeles. It is said to exceed the tooling properties of other phenolic casting resins because it has been plasticized for extremely low viscosity and will not readily retain air bubbles as it solidifies. Describes typical properties, molds for the resin, fillers, and typical applications.

9533 Platable Phenolic. *Modern Plastics*, v. 29, June 1952, p. 86.
Discusses a new conductive compound for the molding of parts which can be electroplated directly in acid baths of copper, nickel, or zinc.

9534* Cold Cast Chemical Equipment. *Modern Plastics*, v. 29, June 1952, p. 88-89.
Briefly describes new modified phenolic-resin with an inert carbon filler which has good corrosion resistance. Made by Pennsylvania Salft Mfg. Co., Philadelphia; and is being used for piping, valves, pumps, towers, etc.

9535 Continuous Production of Polyester Pipe. F. B. Stanley. *Modern Plastics*, v. 29, June 1952, p. 95-98, 100.
Describes and illustrates a new production method whereby fibrous glass-polyester pipe is built up on a vertical mandrel traveling upward through rotating turntables. It can be produced with a glass-smooth interior finish, and with any desired wall thickness from 0.05 in. up.

9536 Four Pre-Plasticizers in One. *Modern Plastics*, v. 29, June 1952, p. 106-107.
Describes 2-story vertical injection machine constructed to use 4 pre-plasticizers feeding into one injection chamber and with a rated capacity of 375 oz. of polystyrene. Photographs.

9537 Properties of Polymethyl Alpha-Chloroacrylate. M. C. Slone, J. J. Lamb, and F. W. Reinhart. *Modern Plastics*, v. 29, June 1952, p. 109-110, 112, 114, 116, 118, 120, 188.
A report on above for evaluation of a new plastic in aircraft glazing. It is superior to heat-resistant acrylic plastic in tensile and flexural strength properties, hardness, heat resistance, and crazing resistance. It is inferior in resistance to weathering and has a higher specific gravity.

9538 Furfural as a Resin Former. Edward A. Reineck. *Modern Plastics*, v. 29, June 1952, p. 122, 124, 195-196, 199-200.
Deals with the properties which furfural contributes as an aldehyde in phenolic-resin production. Discusses uses of furfural resins.

9539* Kinetics of the α-Azoisobutyric Acid Nitrile Initiated Indene Polymerization. (In German.) J. W. Breitenbach and A. Schindler. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 271-278.
Rate of decomposition of azobutyric acid nitrile in indene and of the resulting polymerization were measured. The polymer was characterized by viscosity measurements. Results are quantitatively explained on the basis of the chain-radical theory of polymerization.

9540* Kinetics of "Polycondensation" of Ethylene Oxide With Phenol. (In German.) F. Patat, E. Cremer, and O. Bobleter. *Monatshefte für Chemie und verwandte Teile anderer Wissenschaften*, v. 83, no. 2, 1952, p. 322-333.
Presents details of experimental and theoretical investigation. 12 ref.

9541 Cationic Polymerization and Related Problems. P. H. Plesch. *Nature*, v. 169, May 17, 1952, p. 828-829.
Summary of conference on cationic polymerization and related problems held at University College of North Staffordshire during Mar. 24-26.

9542* Progress in Dip-Molding With P. V. C. Paste. *Plastics*, v. 17, May 1952, p. 117-120.
Illustrates production of various products by above method.

9543* Technique and Design of Pin-Point Gating With Injection Moulds. I. W. M. Halliday. *Plastics*, v. 17, May 1952, p. 152-154.
Underlying principles of above technique, and objectives sought

are discussed. Important design factors, points of departure from conventional gating practice, and advantages claimed for pinpoint gating are also described. (To be continued.)

9544 Beater Saturated Gasketing Materials. *Product Engineering*, v. 23, June 1952, p. 164-166.

Cellulosic or asbestos fibers treated with water dispersions of rubber or resin, prior to being formed into sheet, provide the base for new classes of gasketing materials having high tensile strength, good dimensional stability, high crush resistance, and uniform compressibility with load.

9545 Finishes for Plastics. Stanley R. Melvin. *Product Engineering*, v. 23, June 1952, p. 167-174.

Finishing techniques described include decoration by means of lacquering, printing, and application of decalcomania; metallizing; destaticizing; annealing; machining; and assembly. The first three classifications are discussed in this article. Colored pictures. (To be continued.)

9546 High-Polymer Solutions. T. B. Grimley. *Proceedings of the Royal Society*, ser. A, v. 212, May 7, 1952, p. 339-361.

A theoretical, mathematical analysis. Average dimensions of a chain with interactions are calculated by a statistical method. The theory is illustrated by applying it to some recently published data on the systems: polystyrene-butanone, polystyrene-toluene, and polyisobutylene-cyclohexane.

9547 Frictional Properties of Plastics. K. V. Shooter. *Proceedings of the Royal Society*, ser. A, v. 212, May 22, 1952, p. 488-491.

Frictional properties of a group of linear polymers were investigated over a range of loads from 0.04 to 10,000 g. Deviations from Amontons' law occur at light loads. At heavy loads, frictional force is proportional to area of contact. Force per unit area of contact resisting sliding can be calculated from frictional force, and was found to be roughly equal to the specific shear strength of the plastic itself. An important exception to these conclusions is polytetrafluorethylene.

9548* Colour in the Rubber and Plastics Industries. J. T. Watts. *Rubber Age and Synthetics*, v. 33, May 1952, p. 111-115.

Practical discussion of the above includes photographs in color and in black-and-white.

5949* A New Plastic Base Sewer Jointing Compound. Raymond B. Seymour, Walter R. Pascoe, and Robert H. Steiner. *Water & Sewage Works*, v. 99, May 1952, p. 210-216.

Gives details of new development of Maxmillian F. Wirtz Memorial Research Laboratories. Extensive tables and graphs show comparative properties of different experimental and proprietary sewer jointing compounds; effects of plasticizers, primers, etc.; effects of long-term heating; results of root resistance tests; and of thermal shock, load deflection, and adhesion tests. 13 ref.

9550* Mechanism of Copolymerization of Methyl-l-Methacrylate With Allylmethacrylate. (In Russian.) B. N. Rutovskii and A. M. Shur. *Zhurnal Prikladnoi Khimii*, v. 24, Nov. 1951, p. 1173-1180.

Above was investigated experimentally. Data are charted, tabulated, and analyzed.

9551* Transformation of Polymers in the Presence of the Pentaerythic Ester of Methacrylic Acid. (In Russian.) A. Ia. Drinberg, Sh. N. Golant, and L. I. Gol'dfarb. *Zhurnal Prikladnoi Khimii*, v. 24, Nov. 1951, p. 1181-1190.

Second in a series of reports on the transformation of linear, saturated polymers into 3-dimensional polymers. A study was made of the polymerization of polybutylmethacrylate, perchlorvinyl, polythene, and polychlorvinyl. Oxygen was found to be necessary for the reactions to occur. Data are tabulated.

9552* Influence of Several Metal Oxides on the Stability of Perchlorovinyl Resins at Elevated Temperatures. (In Russian.) I. I. Denker and A. A. Berlin. *Zhurnal Prikladnoi Khimii*, v. 24, Dec. 1951, p. 1311-1316.

The influence of oxides such as ZnO, Fe_2O_3, TiO_2, and Cr_2O_3, when used as pigments in the above resins, was studied. Data are tabulated.

Books

9553 Synthetic Resins and Allied Plastics. Ed. 3. R. S. Morrell and H. M. Langton, editors. 747 pages. 1951. Geoffrey Cumberlege, Oxford University Press, London and New York. (TP978 M83s3)

Chapters of this comprehensive reference work were prepared by different authors, as in previous editions. Since the 1943 edition, theories concerning the chemistry of the phenol-formaldehyde, amino-formaldehyde, and certain other synthetic resins have undergone revision. In addition to new matter distributed among the relevant chapters, there is a new chapter dealing with shellac.

See also:
8438 (synthetic resins in the foundry)
8791 (corrosion-preventive coatings in packaging)
8942 (wear of rubber in telephone switching apparatus)
9168 (photoelastic study of hardness of plastics)
9169 (fractures in plastics caused by stress waves)
9170 (cracks and stress waves in plastics)
9364 (wetting of polymer surfaces)
9576 (modern rubber adhesive)
9594 (course of reaction of styrene copolymers)
9595 (properties of cross-linked polycondensation polymers)
9679 (stopping power of polystyrene for α-particles)
9793 (resin bonded transformer insulation)

29. RUBBERS AND OTHER ELASTOMERS

9554* Measuring by Nuclear Resonance of the Elongation Effect of Rubber on the Basis of Its Elongation Time T_2. (In French.) Armand Cohen-Hadria and Robert Gabillard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1877-1879.

Reports on experiments on variations of the relaxation times of rubber as a function of temperature. Influence of these variations on elongation of the samples is indicated. Data are charted.

9555* The Common Influence of Phenyl-β-Napthylamine, Sulfur, and Vulcanization Accelerators on the Oxidation of Natural Rubber. A. S. Kuz'minskii and N. N. Lezhnev. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Mar. 1, 1952, p. 111-114.

Results of investigation are charted and discussed.

9556 Structure of Alkali Metal-Catalyzed Butadiene Polymers. A. W. Meyer, R. R. Hampton, and J. A. Davison. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2294-2296.

Structures of various types of above polymers were determined from infrared absorption measurements.

9557 The Diamagnetic Anisotropy of Natural and Synthetic Rubbers. Elizabeth Weir Toor and P. W. Selwood. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2364-2368.

Change in anistropy with elongation was found for natural rubber and for several synthetic rubbers. Differences between natural rubber and polybutadiene and between saturated and unsaturated rubbers are discussed. 17 ref.

9558 Physical Properties of Natural and Synthetic Rubber Materials at Low Temperatures. J. Z. Lichtman and C. K. Chatten. *Analytical Chemistry*, v. 24, May 1952, p. 812-818.

Survey of equipment and methods in order to standardize appropriate ones and to determine degree of correlation of test data. Comparison of data derived in evaluating typical stocks exposed at low temperatures and tests using a torsion-wire apparatus and a hardness-indentation device confirm existence of a mathematical relationship between flexural modulus and hardness indentation. 23 ref.

9559 Ozone Crack Depth Analysis for Rubber. John S. Rugg. *Analytical Chemistry*, v. 24, May 1952, p. 818-821.

Method developed follows change in crack depth as the criterion of extent of damage. It has been used to analyze results of ozone cracking in which commonly recognized variables were employed. Results confirm some previously reported trends. The method can be used in measuring effect of compounding variables.

29. *Rubbers and Other Elastomers*

9560* The Possible Nature of the Synthesis of "Koresin" and the Polyfunctional Nature of Certain Naphthenates. E. G. Curphey. *Chemistry & Industry*, May 3, 1952, p. 389-392.

During the war the Germans utilized "Koresin" to improve the poor tack qualities of Buna S and so improve the adhesion of the ply to the tread during the early stages of the manufacture of tires made from synthetic rubber. Several suggestions are made concerning chemical factors. 15 ref.

9561* Some Factors Affecting the Results of Mooney Viscosity Determinations. P. Braber. *India-Rubber Journal*, v. 122, May 3, 1952, p. 7-11.

Work described was carried out to clarify some of the discrepancies encountered in Mooney testing in the technical classification of natural rubber.

9562 Economic and Physical Aspects of GR-S Modifications. R. P. Dinsmore. *India-Rubber Journal*, v. 122, May 31, 1952, p. 4, 7-11, 19-20.

Lecture includes graphical and tabular data.

9564* A Study of Various Low-Temperature Test Procedures. A. F. Helin and B. G. Labbe. *India Rubber World*, v. 126, May 1952, p. 227-231; June 1952, p. 365-368.

Results of a comprehensive program to study the relative merits of the principal methods used for evaluating low-temperature properties of rubber. Extensive tabular data.

9565 Nickel Compounds in Elastomers. John J. Verbanc. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1023-1027.

Includes tabular and graphical data. 19 ref.

9566* Quantitative Characterisation of Cure. I. Relationship Between "Modulus" and "Strain" in Pure Gum Natural Rubber Vulcanisates. R. F. Blackwell. **II. Use of Modulus as a Measure of the State of Cure in Pure Gum Natural Rubber Vulcanisates.** W. P. Fletcher, Geoffrey Gee, and S. H. Morrell. **III. Relation Between Compound Viscosity and Vulcanisate Stiffness in Pure Gum Natural Rubber Vulcanisates.** R. F. Blackwell, W. P. Fletcher, and Geoffrey Gee. **IV. Definition and Measurement of "Rate of Cure" for Pure Gum Natural Rubber Compounds.** Geoffrey Gee and S. H. Morrell. *Transactions of the Institution of the Rubber Industry*, v. 28, Apr. 1952, p. 73-116.

Graphs, tables, photograph. 17 ref.

9567* Factice: Its Use and Function in Rubber Technology. J. B. Harrison. *Transactions of the Institution of the Rubber Industry*, v. 28, June 1952, p. 117-135; disc., p. 136-138.

Elaborates the characteristic properties conferred by factice in rubber compounding. This is followed by a discussion of the possible mechanism of the vulcanization of oils, the types of products produced, and their probable molecular configuration.

9568* Mechanism of the Gelling of Hevea Latex by Zinc Compounds. G. M. Kraay and M. Van Den Tempel. *Transactions of the Institution of the Rubber Industry*, v. 28, June 1952, p. 144-155.

Results of experimental investigation, which may lead to new methods for evaluation of latex. Tables and graphs.

9569 Statistical Mechanics of Rubber. F. W. Boggs. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 632-636.

Shows that, above the 2nd-order transition, the partition function of a rubber can be represented to a reasonably good approximation by the product of the partition function of a liquid formed of molecules similar to the chain elements and the partition function of the noninteracting chains divided by the partition function of a perfect gas. By this same procedure, all thermodynamic properties of elastomer-solvent systems can be obtained. Graphs. 14 ref.

9570* Some New Butadiene Copolymers. C. S. Marvel, T. R. Fukuto, James W. Berry, W. K. Taft, and B. G. Labbe. *Journal of Polymer Science*, v. 8, June 1952, p. 599-605.

Relates recent efforts to produce and evaluate, as rubbers, new copolymers of butadiene which have the oil-resistance characteristics of the acrylonitrile and methacrylonitrile copolymers and which have better low-temperature properties than these copolymers exhibit. Tables.

9571* New Elastic Materials. (In German.) E. Weinbrenner. *Kautschuk und Gummi*, v. 5, Apr. 1952, p. WT49-WT54.

Reviews patents and literature on above, discusses structure of the polyester of dialcohol and dicarboxylic acid, reactions of polyesters with di-isocyanate, effects of water on the di-isocyanate group, properties of polyesters, bi-functional alcohols as wetting agents, processing methods, uses of these synthetic rubbers, and production of elastic foam rubber.

9572* Dependence of Structure-Forming Ability of Fillers on Method of Their Introduction Into Rubber. (In Russian.) A. P. Pisarenko. *Legkaia Promyshlennost*, v. 11, Dec. 1951, p. 22-23.

The action of several fillers is discussed. Data are tabulated.

9573 Hypalon S-2. A New Elastomer. R. R. Warner. *Rubber Age*, v. 71, May 1952, p. 205-221.

Initial description of DuPont's new highly-durable chlorosulfonated polythene now being made in pilot-plant quantities. It can be processed with conventional rubber machinery and cured into products that combine complete resistance to ozone; excellent resistance to abrasion, heat, sunlight, and weather; unusually good flex-life and resistance to crack-growth; low water absorption; good low-temperature properties without plasticizers; and a wide color range. Numerous tables and graphs.

9574 Code and Specification For Identification of Plasticizers From Petroleum. Fritz S. Rostler. *Rubber Age*, v. 71, May 1952, p. 223-228.

Presents above for the purpose of standardizing specifications and simplifying nomenclature. Tables. 12 ref.

9575* High Styrene-Butadiene in Leather-Like Soling Compounds for Footwear. *Rubber Age and Synthetics*, v. 33, May 1952, p. 175.

Briefly discussed.

9576* Modern Rubber Adhesives. A. Bramley. *Rubber Age and Synthetics*, v. 33, May 1952, p. 160-161.

A survey, Tables and 10 ref.

9577* Continuous Extrusion and Coagulation of Latex for the Production of Latex Thread. R. G. James. *Rubber Age and Synthetics*, v. 33, May 1952, p. 167-169.

Equipment and procedures, as well as mathematical calculations.

9578* The Cold Casting Process For Latex Using Plaster Moulds. A. A. Round. *Rubber Age and Synthetics*, v. 33, May 1952, p. 169-170.

Briefly described.

9579* The Molecular Structure and Properties of Rubber. V. I. Kasatochkin and B. V. Lukin. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 12-14. (Translated from *Doklady Akademii Nauk USSR*, v. 67, Aug. 1, 1949, p. 683-685.)

Previously abstracted from original.

9580* The Nature of Structural Changes of Butadiene Rubbers Caused by High Temperatures (100-200°C.). A. S. Kuzminskii, I. A. Shokhin, and R. M. Belitzkaya. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 33-35. (Translated from *Doklady Akademii Nauk USSR*, v. 74, Oct. 1, 1950, p. 725-727.)

Previously abstracted from original.

9581* Effect of Temperature and Rate of Stretching on the Tensile Strength of Vulcanizates. B. A. Dogadkin and D. M. Sandomirskii. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 50-55. (Translated from *Kolloidnyi Zhurnal*, v. 13, July-Aug. 1951, p. 262-272.)

Results of investigation of the above for vulcanized butadiene-styrene rubber. Tables and graphs. 10 ref.

9582* Application of Drop Analysis to the Detection of Compounding Ingredients in Rubber Mixtures. II. L. M. Kulberg, G. A. Bloch, and E. A. Golybkova. *Rubber Chemistry*

and Technology, v. 25, Jan.-Mar. 1952, p. 152-156. (Translated from *Zavodskaya Laboratoriya*, v. 15, Sept. 1949, p. 1034-1038.)

Previously abstracted from original.

9583* Qualitative Analysis of Rubber Mixtures. II. S. I. Burmistrov. *Rubber Chemistry and Technology*, v. 25, Jan.-Mar. 1952, p. 157-160. (Translated from *Zavodskaya Laboratoriya*, v. 15, Sept. 1949, p. 1039-1042.)

Previously abstracted from original.

See also:

8791 (corrosion-preventive coatings in packaging)
8942 (wear of plastics in telephone switching apparatus)
9220 (synthetic rubber for leather impregnations)
9548 (colored pigments in rubber industry)
9654 (rubber impregnated with MgO and lubricant as recording medium)
9793 (rubber transformer insulation)

30. PAINTS, VARNISHES, LACQUERS, AND ENAMELS

9584 Fire Retarding Paints. Leon Sternberg. *American Paint Journal*, v. 36, May 26, 1952, p. 69, 72, 74, 76, 78.

A survey listing properties a good fire-retarding paint should have, giving representative available formulas, and discussing their failings in general. 15 ref.

9585 The Writing Of Specifications For Coatings. E. G. Bobalek. *American Paint Journal*, v. 36, June 9, 1952, p. 30, 32, 34-35, 38, 40, 42; June 16, 1952, p. 78, 80-81, 83-84, 86. Tables.

9586 Maleinization With Maleic Anhydride and Fumaric Acid. M. B. Hundert. *American Paint Journal*, v. 36, June 9, 1952, p. 78, 80, 82, 84, 86, 88.

Discusses reactions of above compounds with rosin and with drying oils.

9587* New Organic Pigments. (In German.) E. Korinth. *Angewandte Chemie*, v. 64, May 1952, p. 265-269.

Discusses research on production of decorative and protective pigments, with special emphasis on manganese blue as an industrially satisfactory pigment. Graphs, photomicrographs, and numerous references.

9588 Materials For Tailor-Made Coatings. B. G. Brand. *Battelle Technical Review*, v. 1, May 1952, p. 48-51.

The ingredients of organic coatings—their properties, effects, and applications: pigments, extenders, vehicles, solvents, and additives. Development of improved inner coating for steel drums for Steel Shipping Container Institute at Battelle.

9589 Pennsalt Gives Key to Savings in Painting Costs. Robert R. Pierce. *Chemical Engineering*, v. 59, May 1952, p. 149-153.

On basis of comprehensive evaluation of general-purpose systems in chemical-industrial atmospheres, a 3-coat system that will give enough build per coat for a 5-mil minimum total thickness is recommended. 62 paint materials were studied. Data are tabulated and charted. Some results are illustrated.

9590* Anti-Vibration Paints. J. B. Slavik and J. Nemec. *Engineers' Digest*, v. 13, May 1952, p. 142-144. (Translated and condensed from *Strojirestvi*, v. 1, no. 1, 1951, p. 29-33.)

Experiments to determine the effect of several Czech-produced anti-vibration paints on the damping of vibrations, particularly those in the sonic range. Table and graphs.

9591 Thermal Polymerization of Drying Oils; Isomers of Methyl Linoleate. R. F. Paschke, John E. Jackson, and D. H. Wheeler. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1113-1118.

Includes infrared absorption data. Tables and graphs. 22 ref.

9592 Preparation of Oil-Modified Glyceryl Phthlate Drying Resins; Investigation of the Monoglyceride Method. Robert H. Runk. *Industrial and Engineering Chemistry*, v. 44, May 1952, p. 1124-1126.

9593 Zinc Protects Trailer Parts From Corrosion. W. G. Patton. *Iron Age*, v. 160, May 29, 1952, p. 82-84.

A zinc protective coating, Zincilate 300, has been used extensively by Fruehauf Trailer Co., to protect steel parts from corrosion. This company has found the protective coating more expensive than prime paint but less costly than hard-to-get Cd. It gives good coverage and may be quickly applied by brush, spray, or dip.

9594 Styrene Copolymers—Recent Work on the Course of the Reaction. F. Armitage. *Journal of the Oil & Colour Chemists' Association*, v. 35, May 1952, p. 195-213; disc., p. 213-217.

Shows that when sorbic acid and β-eleostearic acid are reacted with styrene in xylene solution, free-radical copolymerization of the monomers proceeds simultaneously with formation of a Diels-Alder adduct. Describes a method for separating free polystyrene from styrenated (and non-styrenated) drying-oil fatty acids. Tables. 36 ref.

9595 The Properties and Composition of Some Cross-Linked Polycondensation Polymers. F. T. Walker and T. Mackey. *Journal of the Oil & Colour Chemists' Association*, v. 35, May 1952, p. 218-226.

Progress report in relation to producing an improved synthetic binder for linoleum manufacture. Discusses polyesters and polyester gels, and introduction of unsaturated monomers including styrene. Table. 17 ref.

9596 A Survey of Cellulosic Lacquer Coatings. Edward Engel. *Organic Finishing*, v. 13, May 1952, p. 10-12, 21.

9597* The Relationship of the Chemistry of Urea and Melamine Resins to Their End-Uses; Organic Solvent Soluble Resins for Surface Coatings. Charles H. Parker. *Paint Industry Magazine*, v. 67, Apr. 1952, p. 11-14.

13 references.

9598 Examination of Varnish-Making Vegetable Oils. I. H. W. Chatfield. *Paint Manufacture*, v. 22, Mar. 1952, p. 90-94.

Reviews characteristics required of an ideal varnish-making vegetable oil, and surveys tests employed to assess oils for these qualities. (To be concluded.)

9599 Paint Viscosity Meters. I. R. Quarendon. *Paint Manufacture*, v. 22, May 1952, p. 163-168, 181.

Illustrates and describes various types of above and discusses their functions, limitations, and fields of usefulness.

9600 Wax Type Protective Coatings For Industry. S. O. Greenlee and F. C. Kraatz. *Paint, Oil & Chemical Review*, v. 115, June 5, 1952, p. 16-18, 20, 44-45, 48.

Chiefly discusses formulated wax systems, their properties, and uses. Briefly mentions varied applications as metal coatings including: metal sparkplug shells; miscellaneous corrosion-prevention uses; impact extrusion of Al collapsible tubes; and deep-drawing operations.

9601* Clear Protective Coatings for Copper-Chromium Plate. Wayne R. Fuller. *Plating*, v. 39, June 1952, p. 616-618, 622.

Describes screening tests for various types of resins for the above. Discusses processing factors, stripping, coating repair, and coatings on Zn.

9602* Contribution to the Study of the Action of Styrene on Drying Oils and Their Fatty Acids. (In French.) J. Petit and P. Fournier. *Bulletin de la Société Chimique de France*, Mar.-Apr. 1952, p. 287-292.

Discusses industrial linseed oil, action of styrene on the fatty acids of linseed oil and tung oil, and conditions for preparing styrenated linseed oil in the laboratory. Tabular data.

Books

9603 Oils, Resins, and Varnishes. William C. Spitzer. Unpaged. (TP935 Sp480-Oversize.)

A lecture series presented at Illinois Institute of Technology In mimeographed, looseleaf form.

30. *Paints, Varnishes, Lacquers, and Enamels*

See also:
8371 (wollastanite as paint raw materials)
8602 (organic coatings for metallizing)
9545 (finishes for plastics)

31. AGRICULTURAL RESEARCH

9604* The Fixation Capacity of Soils for H_2PO_4 Ions. (In French.) Albert Demolon, Pierre Boischot, and Jacqueline Lajon. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1820-1823.

The above problem was investigated with respect to the effect of the presence of iron hydroxide, humus, clay, and lime. Results are interpreted. Tables.

9605* Agricultural Research. Stanley B. Freeborn. *Agricultural Chemicals*, v. 7, May 1952, p. 55-57, 129, 131, 133.

An outline of current problems in agriculture and their relation to agricultural chemicals.

9606* Should Pesticides be Mixed With Fertilizers? F. L. Bentz, Jr. *Agricultural Chemicals*, v. 7, May 1952, p. 63-65.

Discusses above, covering such topics as advantages and problems of combinations. Concludes that mixtures should be used only for specific purposes and then only after careful research studies.

9607* Application of Electrostatic Charging to the Deposition of Insecticides and Fungicides on Plant Surfaces. Henry D. Bowen, Peter Hebblethwaite, and Walter M. Carleton. *Agricultural Engineering*, v. 33, June 1952, p. 347-350.

Describes fundamental principles, as well as equipment and procedures.

9608* Stomatal Closure in Kidney Bean Plants Treated With Ammonium 2-4-Dichlorophenoxyacetate. Dorothy Bradbury and W. B. Ennis, Jr. *American Journal of Botany*, v. 39, May 1952, p. 324-328.

Evidence obtained indicated that early stomatal closure in treated leaves was a direct effect of the growth regulator on the leaves rather than an indirect effect on the water-absorbing mechanism of the roots.

9609* Nitrogen Fixation by Blue-Green Algae and Their Nitrogenous Composition. A. E. Williams and R. H. Burris. *American Journal of Botany*, v. 39, May 1952, p. 340-342.

Describes tests for N_2 fixation by 10 uni-algal, bacteria-free cultures, and analyses for a number of amino acids in 3 species of blue-green algae. Tables. 13 ref.

9610* Development of Resistance by *Micrococcus Pyogenes* Var. *Aureus* to Antibiotics: Morphological and Physiological Changes. Ilda McVeigh and Charlie Joe Hodby. *American Journal of Botany*, v. 39, May 1952, p. 352-359.

Graphs and tables.

9611* Factors Influencing the Content of Ascorbic Acid in Leaves. (In Russian.) F. Ia. Mekhanik. *Botanicheskii Zhurnal*, v. 37, Jan.-Feb. 1952, p. 71-74.

The influence of chlorophyll, carbon, oxidizing activity of the plant tissues, and temperature on content of ascorbic acid in the leaves of several plants was investigated. Data are tabulated and charted.

9612 Studies on the Treatment of Contaminated Combs and Honey With High Velocity Electrons. H. Katznelson, C. A. Jamieson, E. J. Lawton, and W. D. Bellamy. *Canadian Journal of Technology*, v. 30, Apr. 1952, p. 95-103.

Shows that high velocity electrons are effective in killing *Bacillus larvae* spores in thin sections of comb containing American foulbrood scale and in honey. Reports results on other sporeformers and on yeasts. A resonance-transformer-type cathode-ray unit was used. Tables and graphs. 16 ref.

9613 Half-Century of Amino Acid Investigations. William C. Rose. *Chemical and Engineering News*, June 9, 1952, p. 2385-2388.

A review with discussion of recent experiments on human nutrition. 32 ref.

9614* Problems Arising From the Use of Chemicals in Food; Inorganic Residues in Food. A. T. Parsons. *Chemistry & Industry*, May 3, 1952, p. 384-388; disc., p. 388.

Surveys presence of trace elements naturally present in vegetable and animal products; sources of contamination with excessive amounts from spraying, fertilizing, and other sources; and tolerances for the various elements. 26 ref.

9615* Activation of Sodium 2-(2,4-Dichlorophenoxy)-Ethyl Sulfate. Robert B. Carroll. *Contributions From Boyce Thompson Institute*, v. 16, Jan.-Mar. 1952, p. 409-417.

Results of tests on the effect of H-ion concentration on the activation of above compound are reported. 11 ref.

9616* Substituted Benzoic Acids As Growth Regulators. P. W. Zimmerman, A. E. Hitchcock, and Edward A. Prill. *Contributions From Boyce Thompson Institute*, v. 16, Jan.-Mar. 1952, p. 419-427.

Concerned principally with 3 physiologically-active substituted benzoic acid derivatives. These and several other substituted benzoic acids previously reported are compared. 12 ref.

9617* Biological Activation of Sodium 2-(2,4-Dichlorophenoxy) Ethyl Sulfate by *Bacillus Cereus* Var. *Mycoides*. A. J. Vlitos. *Contributions From Boyce Thompson Institute*, v. 16, Jan.-Mar. 1952, p. 435-438.

Concerned chiefly with the isolation from soil of organisms effective in converting above compound to an active plant-growth regulator. Preliminary experiments concering the chemical steps involved in the activation are also discussed.

9618* Use of Allyl Alcohol for Weed Control in Forest Nurseries. T. E. Maki and R. M. Allen. *Journal of Forestry*, v. 50, June 1952, p. 470-471.

9619 Measurement of Surface Phosphate on Hydroxylapatite and Phosphate Rock With Radiophosphorus. Sterling R. Olsen. *Journal of Physical Chemistry*, v. 56, May 1952, p. 630-632.

An isotope-exchange method was applied to measurement of surface P^{32}. Results provide a basis for studies on the nature of surface phosphate reactions between native and applied phosphate in calcareous soils. Tables. 12 ref.

9620* Aggregate Analysis of Soils. I. Apparatus and Method. Khazan Singh. *Journal of the Science of Food and Agriculture*, v. 3, May 1952, p. 205-209.

Describes sieving machine, based on the principle of the reciprocating movement of a lift, to raise and lower a series of sieves for dry and wet sieving of soils. Results obtained in a study of the stability of aggregates of a soil with this machine are reported. Photographs, tables, and graph.

9621* Stability of Contact Insecticides. I. Ultra-Violet Photolysis of the Pyrethrins. II. Protection of the Pyrethrins Against Ultra-Violet Photolysis. R. E. Blackith. *Journal of the Science of Food and Agriculture*, v. 3, May 1952, p. 219-230.

Graphs and tables. 22 ref.

9622* Antibacterial Principles From Some Higher Fungi. S. R. Rose. *Journal of Scientific & Industrial Research*, v. 11B, Apr. 1952, p. 159-160.

During a survey of fungi as possible resources of antibacterial substances, it was found that the culture medium in which a number of higher fungi were grown prossessed strong, antibacterial activity.

9623 Molybdenum Deficiency in Lettuce. William Plant. *Nature*, v. 169, May 10, 1952, p. 803.

Symptoms of Mo deficiency observed were similar to those already reported. Yields due to treatments involving either ground limestone or sodium molybdate were roughly doubled compared with mean of the control and gypsum treatment. Confirms general experience that correction of Mo deficiency can be successfully carried out by raising soil pH to a level where Mo becomes available.

9624 Herbicides and Systemic Fungicides. R. W. Marsh. *Nature*, v. 169, May 17, 1952, p. 814-816.

Summary of proceedings of joint meeting, held at Imperial College, London, Mar. 14, of Association of Applied Biologists and Crop Protection Panel of Society of Chemical Industry.

9625 Comparisons of Insecticidal Activation. P. S. Hewlett. *Nature*, v. 169, May 17, 1952, p. 844-845.

Various substances activate certain insecticides, especially the pyrethrins; that is, these substances, though themselves nontoxic, intensify the toxic action of pyrethrins or other insecticides. Outlines results of quantitative study of two preparations containing methylenedioxyphenyl.

9626 Antagonistic Action of Certain Stereoisomers on the Plant Growth-Regulating Activity of Their Enantiomorphs. M. S. Smith, R. L. Wain, and F. Wightman. *Nature*, v. 169, May 24, 1952, p. 883-884.

9627 Response of Field-Grown Peaches to Strontium Sprays. Benjamin Wolf and S. J. Cesare. *Science*, v. 115, May 30, 1952, p. 606-607.

Application of a strontium chloride spray to peach trees eliminated marked chlorosis of the leaves. Illustrated.

9628* Pre-Harvest Chemical Top Killing of Legume Seed Crops. II. General Effects of Cyanamid Compounds. G. S. Cooper and W. G. Corns. *Scientific Agriculture*, v. 32, May 1952, p. 281-284.

9629* Plant Cancer. Armin C. Braun. *Scientific American*, v. 186, June 1952, p. 66-68, 70, 72.

The tumorous growth of plants called crown gall is analogous to malignant animal tumors. Because its origin is understood, it is a valuable tool for the study of abnormal growth in cells. Illustrated.

9630* Use of Dithizone as an Extractant to Estimate the Zinc Nutrient Status of Soils. Ellsworth Shaw and L. A. Dean. *Soil Science*, v. 73, May 1952, p. 341-347.

Above procedure was investigated. Factors affecting the results, such as time of extraction, pH, and mechanical and thermal pretreatment, were examined. Optimum conditions were selected, and the test was applied to soil samples representing many different soils from major areas of Zn deficiency in the U. S. A scatter diagram shows a relationship among soil pH, dithizone-extractable Zn, and occurrence of plants with Zn-deficiency symptoms. 13 ref.

9631* Effect of Iron and Aluminum Oxides on the Release of Calcium and on the Cation-Anion Exchange Properties of Soils. A. Mehlich. *Soil Science*, v. 73, May 1952, p. 361-374.

Effect of type of colloid, including montmorillonite, kaolinite, gibbsite, geothite, and hematite, on release of Ca with HCl and on content of cations of cotton and turnip tops was studied. In some of these experiments, the anion exchanger IR-4B in a mixture with a montmorillonitic soil was studied. Cation- and anion-exchange capacities of the various systems were determined. 23 ref.

9632* Accumulation of the Major Bases and Heavy Metals in Florida Citrus Soils in Relation to Phosphate Fretilization. Walter Reuther, Paul F. Smith, and Alston W. Specht. *Soil Science*, v. 73, May 1952, p. 375-381.

Concerned with trend of total Ca, Mg, K, Cu, Mn, and Zn in soil from two long-term field phosphate experiments with oranges in Florida. Three levels of superphosphate and a no-phosphorous treatment are compared in two experimental orchards on acid, sandy soil. Magnitude of the trends was not great enough to be of much significance. 15 ref.

9633* Leaching of Calcium in a Fine Sandy Loam as Indicated by Ca45. James M. Blume. *Soil Science*, v. 73, May 1952, p. 383-389.

Describes procedure. Results of laboratory studies.

9634* Determination of Soil Moisture by Neutron Scattering. Wilford Gardner and Don Kirkham. *Soil Science*, v. 73, May 1952, p. 391-401.

Shows theoretically, and experimentally for 5 soils, that a method involving scattering and slowing of fast neutrons by hydrogen may be used for measuring soil moisture. A fast-neutron source and a slow-neutron counter (source and counter combined into a single unit) are lowered into a small hole in the soil. The counting rate of neutrons which have been slowed by soil hydrogen is a measure of the moisture content. 15 ref.

9635* Ionization of Soils and Soil Colloids: III. Potassium-Calcium Relationships in Illite, Kaolinite, and Halloysite. S. A. Barber and C. E. Marshall. *Soil Science*, v. 73, May 1952, p. 403-413.

15 references.

9636* Effectiveness of Granulated Fertilizers Using "Gumbrin" (Crude Oil Residue). (In Russian.) R. K. Guseinov. *Sovetskaia Agronomiia*, v. 9, Dec. 1951, p. 76-80.

Tests were made on the above by comparison of "gumbrin"—mineral mixtures with sheep manure-mineral mixtures. Data are tabulated.

9637* Chemical Weeding of Volunteer Sunflowers in Grass Crops. (In Russian.) I. K. Tsitovich, *Sovetskaia Agronomiia*, v. 9, Dec. 1951, p. 85-86.

The sodium salts of 2,4-D, 2-methyl-4-chlorophenoxyacetic acid, and dinitro-orthocresol were used in tests for removing volunteer sunflowers in wheat and barley.

9638* A Respirator for Determining the Decomposition Rate of Organic Substances. (In German.) O. Bienecke. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 56(101), nos. 1-3, 1952, p. 75-79.

Design and operation of above device is described and illustrated.

9639* Effects of Different Potassium and Nitrogen Fertilizers in the Long-Time Experiment at Poppelsdorf (1906-1944). (In German.) E. Schulze and H. Kiepe. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 56(101), nos. 1-3, 1952, p. 90-105.

Effects of experiments on root crops, grains, legumes, grazing crops, and oil and fiber plants are discussed and tabulated. 57 ref.

9640* Research on the Effects of Plant-Protective Agents on Soils and Plants. (In German.) F. Scheffer, E. Welte, and A. Kloke. *Zeitschrift für Pflanzenernährung; Düngung; Bodenkunde*, v. 56(101), nos. 1-3, 1952, p. 151-171.

Comprehensive report on the effects of various synthetic plant protectives (insecticides or fungicides) on soil organisms, soil condition, and plant growth. Photographs and tables. 62 ref.

9641* Structure and Colloid-Chemical Properties of the Clay Minerals. (In German.) P. Schachtschabel. *Zeitschrift für Pflansenernährung; Düngung; Bodenkunde*, v. 56(101), nos. 1-3, 1952, p. 227-238.

Microscopic, X-rav, and electron-optical studies of above were made with the objective of determining effect of clay properties on soil fertility and cation exchange. Diagrams, graphs, and tables. 13 ref.

Books

9642 Insects and Hygiene. James Busvine. 482 pages. 1951. Methuen & Co., Ltd., London. (SB975 B96i)

The first part deals with insect biology, and reviews mechanical, physical, and chemical methods of insect destruction. There are also notes on hygiene propaganda and the legal and commercial aspects of pest control. The chapters on specific pests give life histories and control methods for the following groups: houseflies and blowflies, biting flies (especially mosquitoes), parasitic insects (bugs, lice, fleas), parasitic mites (scabies etc.), food pests (cockroaches, crickets, and various forms attacking stored food), fabric pests (clothes moths and carpet beetles), wood-boring beetles, stinging insects, and minor nuisances.

9643 Ivan Vladimirovich Michurin; Selected Works. (In English.) 496 pages. 1949. Foreign Languages Publishing House, Moscow, U.S.S.R. (SB357 M58s)

Includes a part of Michurin's theoretical and methodological works, pomological descriptions of a number of varieties bred by him, and a series of articles reflecting the public activity of this Russian agronomist whose theories of plant breeding, as carried on and extended by Lysenko, have created such violent controversy.

9644 Forest Entomology. Ed. 3. Samuel Alexander Graham. 351 pages. 1952. McGraw-Hill, New York. (SB761 G76f3)

Emphasizes practical and ecological aspects of the subject.

31. *Agricultural Research*

Principles are illustrated by discussion of representative species selected from each important ecological group of forest insects. Forest entomology is presented as an integral part of forest practice. Examples of insects illustrating the principles discussed are carefully selected from species currently important. Not intended as a handbook of forest insects. Chapters on chemical control have been rewritten to include modern methods of applying insecticides from the air and by means of air-blast machines. Valuable synthetic organic insecticides are also considered.

9645 The Rose in Britain. N. P. Harvey. 174 pages. 1952. Plant Protection, Ltd., London. (SB411 H26r)

A comprehensive, up-to-date review of modern rose culture, written especially for the British reader, but doubtless applicable elsewhere. Special attention has been devoted to topics such as fragrance and the rose as a cut flower. A glossary contains nearly 300 recommended varieties with original descriptions of their virtues and weaknesses. Direct-color pohtographs.

9646 Forest Management. H. Arthur Meyer, Arthur B. Recknagel, and Donald D. Stevenson. 290 pages. 1952. Ronald Press Co., New York. (SD431 M57f)

Textbook for forestry students and practicing foresters. Parts I and II are devoted to the general problems of forest organization. Part III is concerned with principles and methods of forest regulation. Chapter bibliographies.

9647 Poisonous Plants of the United States. Rev. ed. Walter Conrad Muenscher. 277 pages. 1951. Macmillan Co., New York. (QK100.U6 M88p2)

Gives name, description, distribution and habitat, poisonous principle involved, conditions under which poisoning occurs, symptoms of poisoning, and (in the most important cases) recommended treatment for each plant. The species are arranged according to natural families and there is a complete index of botanical and common names. Illustrated by numerous drawings to simplify identification.

See also:
8917 (determining phosphate in plant ash)
8918 (colorimetric determination of soil humus)
8929 ("chemical analysis of soils"—Russian book)
9066 (continuous drying of peanuts)
9351 (fractionation of C isotopes in absorption of CO_2)

32. PHYSICS

9648* Experiments and Remarks on Photophoresis. (In French.) Ouang Te-Tchao. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 7, 1952, p. 1542-1544.

Using a differential torsion-pendulum apparatus, the theory that photophoresis is a radiometric effect was investigated.

9649* Conductivity and Scintillation Effect of Very Thin Deposits of Carbon. (In French.) Nicolas Nifontoff. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 28, 1952, p. 1755-1757.

Variations of resistance as a function of the current density and of scintillation effect (frequency: 6000 cycles per sec.) as a function of current density are compared for deposits of very thin carbon. Graphs.

6950* A New Approximation Method for Study of Subsonic and Transsonic Flow. (In French.) Paul Germain and Marc Liger. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1846-1848.

Mathematical analysis with examples.

9651* Influence of Ultrasonics on the Rate of Crystallization. (In Russian.) A. P. Kapustin. *Vestnik Akademii Nauk SSSR*, Dec. 1951, p. 70-75.

A general discussion.

9652 A Comparison of Adiabatic and Isothermal Expansion Processes in Rocket Nozzles. H. S. Seifert and D. Altman. *Journal of the American Rocket Society*, v. 22, May-June 1952, p. 159-162.

Analysis of expansion of gases through a de Laval nozzle under isothermal conditions. Formulas are derived for isothermal exhaust velocity, mass flow, and thrust coefficient analogous to those for adiabatic flow.

9653* Thermodynamics of Irreversible Processes. I. Prigogine. *Applied Mechanics Reviews*, v. 5, May 1952, p. 193-195.

Briefly describes the above, on the basis of the literature. 23 ref.

9654 A New Recording Medium for Transcribed Message Services. James Z. Menard. *Bell System Technical Journal*, v. 31, May 1952, p. 530-540.

Describes medium composed of rubber impregnated with magnetic oxide and lubricant. It is particularly suited to applications requiring continuous repetition of short transcribed messages. Equipment is diagrammed and illustrated; data are charted.

9655* Mechanical Strength of Piezoelectric Crystals. R. Bechmann and P. L. Parsons. *British Journal of Applied Physics*, v. 3, May 1952, p. 147-150.

Above determined for several piezoelectric materials by direct mechanical and by electrical methods. Gives formula for the current due to the piezoelectric polarization and the maximum safe current for piezoelectric resonators for specific cuts. Tables and diagrams.

9656 The Flow of Fluids Through Activated Carbon Rods. III. The Flow of Adsorbed Fluids. E. A. Flood, R. H. Tomlinson, and A. E. Leger. *Canadian Journal of Chemistry*, v. 30, May 1952, p. 389-410.

Total flow rates of gases through activated charcoal rods are regarded as consisting of the sums of comparatively independent flows through macropores and micropores. The flow rate is related to the relevant adsorption isotherm by means of an empirical equation which can be fitted to observed results within experimental error. A very simple flow equation is derived which is qualitatively in agreement with observed results. A model porous adsorbent was presented which exhibits properties of real adsorbent systems and illustrates relations between adsorbate densities and tensions and pressures within micropore systems. Graphs.

9657* Note on the Interaction Between a Pitot Tube and a Wall. (In French.) André Jaumotte. *Chaleur & Industrie*, v. 33, Apr. 1952, p. 93-97.

Investigates the amount of interaction between a Pitot tube and a wall when the standard coefficient of the sound, measured in a large sized parallel, uniform flow in relation to the sound, is assumed to be invariable. Includes photographs, diagrams, tables, and charts.

9658* Physics of Powder Dispersions. (In German.) H. Nassenstein. *Chemie-Ingenieur-Technik*, v. 24, May 1952, p. 272-277.

Explains effect of degree of mechanical crushing, specific gravity, crystal structure, and surface on the behavior of dispersed powders. Graphs. 39 ref.

9659* The Magnetic Structure of Alnico 5. E. A. Nesbitt and R. D. Heidenreich. *Electrical Engineering*, v. 71, June 1952, p. 530-534.

A study of the mechanism which enables the alloy to respond to heat treatment in a magnetic field. (This treatment produces a three-fold increase in the figure of merit.) Experimental work was guided by theory of Kittel, Nesbitt, and Shockley. Graphs and electron micrographs. 11 ref.

9660 On the Failure of Plane Wave Theory to Predict the Reflection of a Narrow Ultrasonic Beam. Marvin S. Weinstein. *Journal of the Acoustical Society of America*, v. 24, May 1952, p. 284-287.

Reflection measurements made in water with a 3° radiation pattern at a frequency of 3.35 mc. per sec., using both air-backed Al plates of thicknesses of 0.250-0.025 in. and a 2-inch Al slab to approximate a semi-infinite medium, indicate that under certain conditions, plane-wave theory does not satisfactorily predict narrow ultrasonic-beam reflection. Possible value of results in study of transmission phenomena is indicated.

9661* Aerodynamics of Blasts. L. Ting and H. F. Ludloff. *Journal of the Aeronautical Sciences*, v. 19, May 1952, p. 317-328.

Pressure and density fields in the whole domain behind the advancing blast are obtained in explicit analytical form. Comparison with the interferograms taken in Bleakney's laboratory shows surprising agreement.

9662* Heat Transfer to Constant-Property Laminar Boundary-Layer Flows With Power-Function Free-Stream Velocity and Wall-Temperature Variation. Solomon Levy. *Journal of the Aeronautical Sciences*, v. 19, May 1952, p. 341-348.

Numerical computations and their analysis. Graphs and tables. 11 ref.

9663 The Computation of Dielectric Constants. R. M. Redheffer. *Journal of Applied Physics*, v. 23, May 1952, p. 505-508.

Mathematical and graphical treatment of the above.

9664 Contribution to the Theory of the Silicon Carbide Contact. Else Holm. *Journal of Applied Physics*, v. 23, May 1952, p. 509-517.

The high-limiting contact voltage of 40-50 volts in contacts between silicon carbide members (single crystals of the black-green variety) is explained on the basis of the known temperature-voltage relation. 15 ref.

9665* Photoreversal of the Lengthening Effect of Ultraviolet Radiations on the Bacterial Lag Period. Edward J. Beckhorn. *Journal of Bacteriology*, v. 63, May 1952, p. 687-688.

Effects of various irradiation treatments on lag period of *Escherichia coli*, strain B/r, were determined.

9666 The Electrical Conductivity of Liquid Selenium and Selenium-Tellurium Mixtures. B. Lizell. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 672-676.

Measurements in the range 230-500°C. from d.c. to 1 mc. per sec. indicated the conductivities to be frequency-independent at low field strength. For larger fields the conductivity increases and higher d.c. than a.c. values result. A complex mixture of conduction by electrons, holes, and ions is believed to exist. Apparatus diagrams, tables, and graphs.

9667 The Host Crystal Luminescence of Zinc Sulfide Phosphors. Richard H. Bube. *Journal of Chemical Physics*, v. 20, Apr. 1952, p. 708-718.

A study in reference to increasing the blue emission intensity. Effects produced on the above by increasing the preparation temperature without use of additives are compared with effects produced by adding halide at a fixed temperature. Graphs and tables. 28 ref.

9668 Absolute Quantum Efficiencies of Luminescence of Organic Molecules in Solid Solution. Earl H. Gilmore, George E. Gibson, and Donald S. McClure. *Journal of Chemical Physics*, v. 20, May 1950, p. 829-836.

Absolute quantum-yield measurements of fluorescence and phosphorescence were made for a number of organic molecules dissolved in a transparent solid solution (E.P.A.) at 77°K. The efficiencies range from almost zero for bromobenzene to 0.6 for benzophenone. The measurements are believed to be accurate to about 10%.

9669 Ultrasonic Velocity in Liquids and Liquid Mixtures. Bertil Jacobson. *Journal of Chemical Physics*, v. 20, May 1952, p. 927-928.

Develops equation for calculation of the above from intermolecular properties. It has been tested for 55 non-associated organic liquids of widely different kinds and for 5 series of liquid mixtures, each at 4-8 concentrations. In this way, it was found that free lengths can be computed with an accuracy of a few percent from sound velocities determined experimentally. Conversely, if free length is known, sound velocity can be computed with a similar degree of accuracy. Typical data are tabulated.

9670 Temperature Variation of the Magnetostriction of "Alcomax". M. McCaig. *Nature*, v. 169, May 24, 1952, p. 889-890.

Presents graph for preliminary results of above and some related alloys in reference to magnetic anisotropy.

9671* Survey Methods for Fast and High-Energy Neutrons. Burton J. Moyer. *Nucleonics*, v. 10, May 1952, p. 14-19.

For the determination of neutron hazards, the energy spectrum is divided into 3 parts. Discusses 8 methods for surveying neutrons in the ranges from 0.3 to 15 Mev. and from 15 Mev. up.

9672 The Steady Flow of Heat Through Hot Glass. B. S. Kellett. *Journal of the Optical Society of America*, v. 42, May 1952, p. 339-343.

The problem is treated mathematically. Shows that, though infrared energy is absorbed within a short distance by almost any glass, re-radiation of energy by the glass itself is sufficient at glass-melting temperatures to cause a considerable flow of heat.

9673 Optical Properties of Calcium Silicate Phosphors. Gorton R. Fonda and Frank J. Studer. *Journal of the Optical Society of America*, v. 42, May 1952, p. 360.

Briefly presents some new experimental data.

9674* Certain General Methods of Solution of Problems in the Theory of Plasticity. (In Russian.) I. A. Birgur. *Prikladnaia Matematika i Mekhanika*, v. 15, Nov.-Dec. 1951, p. 765-770.

9675* On the Inhibition of Convection By a Magnetic Field. S. Chandrasekhar. *Philosophical Magazine*, ser. 7, v. 43, May 1952, p. 501-532.

Theoretical and mathematical. The theory of the stability of a layer of fluid heated from below which has been developed by Rayleigh, Jeffreys, Pellew, and Southwell is extended to the case when the fluid considered is an electrical conductor and an external magnetic field is impressed on the fluid. 23 ref.

9676* On the Significance of the Limit Load Theorems for an Elastic-Plastic Body. E. H. Lee. *Philosophical Magazine*, ser. 7, v. 43, May 1952, p. 549-560; disc., p. 560-561.

Theoretical and mathematical. Graphs. 11 ref.

9677 p-n Junction Method for Measuring Diffusion in Germanium. W. C. Dunlap, Jr., and D. E. Brown. *Physical Review*, ser. 2, v. 86, May 1, 1952, p. 417-418.

Diffusion of an n-type impurity into a p-type semiconductor creates a p-n junction which can be detected electrically by the thermoelectric effect of a hot needle or by a rectification probe. Study of the rate of penetration of the p-n junction into the semiconductor can be used to measure the diffusion coefficients of various impurities in such semiconductors as Ge or Si. Object of the work described was to establish validity of the method by direct measurement of diffusion, by the p-n junction method, and by the radioactive tracer method. Sb^{124} was the impurity studied. Graphs.

9678 Hexagonal Iron Oxide Compounds as Permanent-Magnet Materials. J. J. Went, G. W. Rathenau, E. W. Gorter, and G. W. van Oosterhout. *Physical Review*, ser. 2, v. 86, May 1, 1952, p. 424-425.

Oxides studied are characterized by the formulas $MeO \cdot 6Fe_2O_3$, and $MeO \cdot 2Fe_2O_4 \cdot 6Fe_2O_3$, respectively, where Me stands for the divalent metals Ba, Sr, or Pb. Only the Ba-compounds are dealt with in this communication. Graphs.

9679 Stopping Power of Polystyrene and Acetylene For Alpha-Particles. R. H. Ellis, Jr., H. H. Rossi, and G. Failla. *Physical Review*, ser. 2, v. 86, May 15, 1952, p. 562-563.

Briefly outlines experiments.

9680 Non-Linear Amplifications in E.M.I. Photomultipliers. J. F. Raffle and E. J. Robbins. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 320-324.

Output pulse heights obtained from E.M.I. photomultipliers were found to be not always proportional to the quantity of light incident on the photo-surface of the photomultiplier. Relation between pulse height and energy loss of α-particles in various fluorescent materials was determined at low values of charge density.

9681 Discontinuities in the Variation of Magnetization With Temperature. V. L. Newhouse. *Proceedings of the Physical Society*, v. 65, sec. A, May 1, 1952, p. 325-328.

Demonstrates that magnetic discontinuities accompany changes of temperature at constant field. The effect was investigated for

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hard-drawn Fe and Ni and is accounted for in terms of two mechanisms, one associated with decrease of coercivity with rise of temperature and the other with disperse field due to thermal oscillations of the carriers of magnetic moment.

9682 The Elastic Behaviour of a Crystalline Aggregate. R. Hill. *Proceedings of the Physical Society*, v. 65, sec. A, May 1, 1952, p. 349-354.

Considers connection between the elastic behavior of an aggregate and a single crystal with special reference to theories of Voigt, Reuss, Huber, and Schmid. Elastic limit under various stress systems was also considered. Illustrated by data on Al, Cu, Au, and α-Fe. Also mentions behavior of steel. 10 ref.

9683 The Absorption Spectra of Single Crystals of Lead Sulphide, Selenide, and Telluride. A. F. Gibson. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 378-388.

Above were examined between 20 and 600°K. Numerous graphs. 12 ref.

9684 The Theory of Gaseous Arcs. I. The Fundamental Relation For the Positive Columns. II. The Energy Balance Equation For the Positive Columns. K. S. W. Champion. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 329-356.

In Part I, it is postulated that 5 fundamental relations apply to high-pressure positive columns, as well as to low. A "natural arc radius" is postulated for low-pressure arcs when the boundaries are removed an indefinite distance. The theory of low-pressure arcs with high electron densities in which ionization by stages is important was developed. All the theory presented includes the effect of a longitudinal magnetic field, and no-field conditions are included as a special case. In Part II, the theory of arcs is developed further by investigating the energy balance equation for high-pressure positive columns. The theory only takes into account energy losses due to convection and conduction; neglect of radiation losses was justified for a wide range of conditions by reference to experimental values of radiation efficiencies. The effect of a longitudinal magnetic field on high-pressure arcs was then investigated. 28 ref.

9685 Electrical Conductivity in the Compounds PbS, PbSe, PbTe. E. H. Putley. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 388-389.

Measurements were made of the conductivity and Hall coefficient of polycrystalline ingots of PbTe and of specimens of Sardinian galena. Similar measurements were made on single crystals of above compounds and results compared with previous measurements and with those of other workers.

9686 The Spontaneous Magnetization of Magnesium Ferrite and Magnesium Ferrite-Aluminate Powders at Low Temperatures. G. O. Jones and F. F. Roberts. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 390-391.

X-ray diffraction studies on $MgFe_2O_4$ suggest that it has the inverse spinel structure. Measurements were also carried out on mixed ferrite-aluminates (solid solutions). 10 ref.

9687 Photochemical Studies With the Gaseous Flash Discharge. I. Uranyl-Oxalate Actinometry at High Intensities. II. Ultra-Violet Characteristics of the Flash Discharge. M. I. Christies and G. Porter. *Proceedings of the Royal Society*, ser. A, v. 212, May 7, 1952, p. 390-406.

In Part I, the possibility of applying uranyl-oxalate actinometry at the intensities produced by high-energy flash discharges was investigated. Shows that the photochemical decomposition of oxalate produced by a high-energy flash is directly proportional to intensity over an intensity range of 1000. Available output in the ultraviolet region is given for several experimental arrangements. In Part II, ultraviolet characteristics of the continuous spectrum emitted by gaseous flash discharge were examined by photometric and actinometric methods. Dependence of energy distribution on wave-length and total output in the photochemically useful region, and on parameters such as energy of the discharge and nature and pressure of the gas filling, were investigated. Results are discussed in relation to mechanism of production of the continuum which is attributed to the recombination radiation of electrons. 30 ref.

9688* Electrochemistry of Fine-Pored Capillary Systems. VI. Convection Conductivity (Theoretical Considerations). (In German.) Gerhärd Schmid. *Zeitschrift für Elektrochemie; Berichte der Bunsengesellschaft für physikalische Chemie*, v. 56, Mar. 1952, p. 181-193.

Smoluchowski's term for surface conduction is replaced by a more precise term for convection conduction and it is shown that convection currents and convection conductivity in finely porous systems will occur even when too-narrow pores eliminate possibility of a Helmholtz double layer. Correct formulas for idealized fine-pored systems are derived. 20 ref.

9689* Absorption of Ultrasound in Dilute Solutions of Phenol in Carbon Tetrachloride. (In German.) Wilhelm Maier and Arthur Mez. *Zeitschrift für Naturforschung*, v. 7a, Mar.-Apr. 1952, p. 300-301.

A graph shows the experimentally determined absorption of ultrasound by solutions of phenol, ethyl alcohol, and CS_2 in CCl_4.

9690*The Luminescence of Alkali Sulfides and Sulfates. (In German.) H. Gobrecht and Dietrich Hahn. *Zeitschrift für Physik*, v. 132, no. 1, 1952, p. 111-128.

Red luminescence is explained by formation of polysulfides and blue luminescence by incorporation of alkali atoms in alkali sulfates. Spectra of the phosphors and intensity of luminescence were measured at different temperatures. Observations help clarify the mechanism of luminescence. Tables and graphs. 10 ref.

Miscellaneous Publications

9691 A Portable Electronic Pile Kinetic Simulator. Walter Pagels. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1422-1426. (TK1 Am35tr)

Self-contained analog computer designed to solve the 7 simultaneous differential equations describing the operation of a nuclear reactor.

9692 "Anti-Incrustant" Electrochemical Processes. (In French.) M. Pourbaix and C. Rorive-Boute. "International Committee on Electrochemical Thermodynamics and Kinetics; Proceedings of the 2nd Meeting" (Libreria Editrice Politecnica Cesare Taburini, Milan, Italy), 1951, p. 240-241. (QC311 C73c)

Discusses briefly an investigation of certain physical processes for treating various waters in order to reduce their tendency to deposit solid incrustations on surfaces with which they come in contact. Without any change in chemical composition of the solutions treated, radiation or action of weak electrical currents on the metal surfaces often seems to reduce the tendency to become incrusted. A theory to explain this effect is suggested, and some work now in progress is outlined. Possibility of application in diverse fields is also indicated.

9693 Internal-Film-Cooling Experiments With 2- and 4-Inch Smooth-Surface Tubes and Gas Temperatures to 2000°F. George R. Kinney. National Advisory Committee for Aeronautics, Research Memorandum E52B20, Apr. 29, 1952, 27 pages. (TL82 Un3rm)

All film-cooling data obtained with smooth-surface tubes were generalized by means of heat-transfer correlation and data obtained over a range of coolant flows. This generalization facilitates estimation of flow of coolant required to film cool a tube for a desired length, over a wide range of conditions, when the temperature and flow of the hot gas are known. 11 ref.

9694 Three-Dimensional Supersonic Nozzles and Inlets of Arbitrary Exit Cross Section. John C. Evvard and Stephen H. Maslen. National Advisory Committee for Aeronautics, Technical Note 2688, Apr. 1952, 12 pages. (TL570 Un3t)

A method is presented for obtaining the above from known axisymmetric flows. Streamlines bounding the desired exit shape are traced through the known basic flow solution to give the required unsymmetric wall contours. Several examples are given.

9685 Condensation of Air in Supersonic Wind Tunnels and Its Effects on Flow About Models. C. Frederick Hansen and George J. Nothwang. National Advisory Committee for Aeronautics, Technical Note 2690, Apr. 1952, 49 pages. (TL570 Un3t)

Results of investigation of the above are presented. Lower and

upper limits for degree of supersaturation attainable before onset of condensation of air are discussed. A method is presented for calculating properties of a stream containing a small fraction of condensed air. Scattering of light from droplets of condensed phase is used to demonstrate the extent of condensation in supersonic air streams and in the flow about models. 23 ref.

9696 On the Form of the Turbulent Skin-Friction Law and Its Extension to Compressible Flows. Coleman duP. Donaldson. National Advisory Committee for Aeronautics, Technical Note 2692, May 1952, 19 pages. (TL570 Un3t)

Derives the above. Ratio of compressible to incompressible skin friction is obtained, and results are shown to agree with experiment. 11 ref.

9697 Reciprocity Relations in Aerodynamics. Max A. Heaslet and John R. Spreiter. National Advisory Committee for Aeronautics, Technical Note 2700, May 1952, 38 pages. (TL570 Un3t)

Reverse-flow theorems in aerodynamics are shown to be based on the same general concepts involved in many reciprocity theorems in the physical sciences. Reciprocal theorems for both steady and unsteady motion are found as a logical consequence of this approach. No restrictions on wing plan form or flight Mach number are made beyond those required in linearized compressible-flow analysis. A number of examples are listed. 29 ref.

9698 Displacement Effect of a Three-Dimensional Boundary Layer. Franklin K. Moore. National Advisory Committee for Aeronautics, Technical Note 2722, June 1952, 15 pages. (TL570 Un3t)

Describes method for determining the above in terms of the mass-flow defects associated with the profiles of the two velocity components parallel to the surface. Numerical values are found for the known 3-dimensional boundary-layer flow about a cone at a small angle of attack to a supersonic stream.

9699 Some Classical Aspects of Atomic Structure. Part I. Dan McLachlan, Jr. Utah Engineering Experiment Station, Bulletin 55, Jan. 1952, 45 pages. (*Bulletin of the University of Utah*, v. 42, no. 4). (TA21 Ut1b)

The author states that this paper "is a very incomplete attempt to correlate quantum mechanics with classical mechanics." Since much of it is devoted to instruction of students, it is suggested that those who read it for critical purposes should omit all except Section V and the appendices C, D, and E, where the new material is to be found.

9700 Some Factors in the Growth of Crystals. Dan McLachlan, Jr., Allan Carlson, Carl J. Christensen, and Alan King. Utah Engineering Experiment Station, Bulletin 57, Jan. 1952, 62 pages. (*Bulletin of the University of Utah*, v. 42, no. 9). (TA21 Ut1b)

A theoretical, mathematical presentation. Sections discuss: extensions of the Donnay-Harker Law; crystal growth from solution; dendritic growth; and evolutionary aspects of crystal growth. 21 ref.

Books

9701 Modern Magnetism. Ed. 3. L. F. Bates. 506 pages. 1951. Cambridge University Press, London. (QC753 B31m3)

Attempts to explain modern magnetic theory not only for students of physics, but for more general readers. Accounts of experimental work, particularly foreign work, are included, not only for their contribution to magnetic theory, but for their importance in industrial applications. Includes information on specific metallic and nonmetallic magnetic materials. Footnote references.

9702 Aerodynamics of the Helicopter. Alfred Gessow and Garry C. Myers, Jr. 343 pages. 1952. MacMillan Co., New York. (TL716 G33a)

Text for senior and graduate students. Theory is developed in its most elemental form. Lengthy mathematical formulas have been avoided except where they are of fundamental significance. A chapter devoted to mechanism of the helicopter and its general characteristics precedes the aerodynamic treatment. Readers are then introduced to aerodynamic theory through an analysis of hovering flight. A thorough discussion of the physical concepts of flapping and feathering is presented. Effects on performance of the various design parameters, such as disk loading, rotor solidity, and blade twist, are discussed. A complete list of all NACA publications relating to rotating-wing aircraft is given. Diagrams and graphs.

9703 Color in Business, Science, and Industry. Deane B. Judd. 401 pages. 1952. John Wiley & Sons, New York. (QC495 J88c)

Explains the psychophysics of color in practical terms—in terms of the purchase, production, and sale of commodities whose color has an important bearing on their usefulness and price. Part I explains fundamentals of the eye, of color, its matching, and deficiencies. Part II deals with spectrophotometry, colorimetry, color scales, etc., giving practical information on tools, techniques, and their applications. Part III deals with gloss, opacity or hiding power, Kubelka-Munk analysis, and with identification and formulation of coloring materials. 16-page bibliography.

9704 Airplane Aerodynamics. Daniel O. Dommasch, Sydney S. Sherby, and Thomas F. Connolly. 520 pages. 1951. Pitman Publishing Corp., New York. (TL570 D71a)

Emphasis is placed on high-speed flight and on modern developments; however, understanding of fundamentals is not sacrificed. Considerable space is devoted to fundamental principles of fluid mechanics and dynamics. Liberal use has been made of NACA publications and other references; however certain portions describe original work.

9705 Mechanics and Properties of Matter. Reginald J. Stephenson. 371 pages. 1952. John Wiley & Sons, Inc., New York. (QC127 St48m)

Stresses physical concepts and their importance to the whole of physics. Uses numerical examples, illustrations, and word explanations of difficult concepts. Method of presentation helps the reader appreciate the physical theory before becoming involved in mathematical procedures. The subject of elasticity is limited to a discussion of homogeneous isotropic materials. Problems follow each chapter.

See also:
8637 (nuclear resonance of transition metals)
8714 (fundamentals of wear)
9042 (spray formed by impinging jets)
9099 (stresses in rapidly heated thin-walled cylinders)
9100 (heat flow in composite slabs)
9202 (nozzles for supersonic wind tunnels)
9612 (high-velocity electrons vs. sporeformers and yeast)

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9706* Operating Characteristics of a Hollow Cathode Lamp, Cooled by Water, in an Atmosphere of Air or Argon at Low Pressure. (In French.) Jean Roig and Maurice Bécart. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, Apr. 16, 1952, p. 1606-1608.

Previous observations in a He atmosphere are confirmed by measurements in air or argon. Data are charted.

9707* Attempt at Interpretation of the Law Giving the Resistance of Thermistors as a Function of Temperature. (In French.) Yves Douchet and Jean-Paul Guignard. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1856-1858.

Reports on measurements for various thermistors at different temperatures, and on substituting the results in established formulas. Results are interpreted.

9708* Electrical Conductivity of Thin Platinum Coatings on Dielectric Bases, Deposited in Vacuum. (In French.) Charles Feldman. *Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences*, v. 234, May 5, 1952, p. 1858-1860.

The conductivity of platinum deposits on KBr, CaF_2, and SiO_2 was investigated. Differences in their conductivity are indicated; an interpretation of the results is proposed.

9709* Heat-Transfer Design Problems in Aircraft Electronic Equipment. Leonhard Katz. *Aeronautical Engineering Review*, v. 11, May 1952, p. 61-68, 81.

Begins with brief discussion of basic principles. Describes work on design of electronic equipment and its cooling systems to per-

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mit the equipment to operate at high altitudes without failure, without regard to reduction in weight; and on design of electronic gear and its associated cooling system to reduce the overall weight of the airplane. Graphs, diagrams, and illustrations.

9710* Nonsymmetry of Current in Alternating Current Arcs With Electrodes of Different Wire Materials. (In Russian.) G. M. Tikhodeev. *Izvestiia Akademii Nauk SSSR*, Section of Technical Sciences, Dec. 1951, p. 1777-1785.

The change of current and voltage with polarity of systems of unlike electrodes is discussed and analyzed. Data are charted for arcs between tungsten anode and Cr-Ni cathode and vice versa, also for carbon-iron arcs.

9711* Application of Aluminum in Constuction of Medium-Sized and Large Transformers. (In German.) J. Müller. *Aluminium*, v. 28, May 1952, p. 156-159.

Compares technical properties and economic factors of conventional transformers and those wound with Al. Illustrations and tables.

9712* Electron Tube Reliability. E. Finley Carter. *Journal of the American Society of Naval Engineers*, v. 64, May 1952, p. 285-291. (Reprinted from *Signal*, Nov.-Dec. 1951.)

Discusses need for greater reliability for industrial and military applications. Gives recommendations for research. Graphs.

9713* Measuring Phase Angles by the Sum or Difference of Potentials. (In German.) Wollrath Denecke. *Archiv für technisches Messen*, Apr. 1952, p. 85-86.

Brief discription is supplemented by circuit diagrams and photographs.

9714 A Wide-Range A-C Bridge Test For Magnetic Materials. D. C. Dieterly and C. E. Ward. *ASTM Bulletin*, May 1952, p. 75-80.

Describes a modified Hay bridge circuit shown to be accurate for Epstein samples or cores but having wider applications. Circuit and wiring diagrams.

9715 Transistors, Mag-Amps in IRE Spotlight. Philip Klass. *Aviation Week*, v. 56, June 9, 1952, p. 41-43, 45-46, 49, 51-52, 54.

A report on the recent IRE-sponsored conference on airborne electronics, Dayton. Covers such topics as: appraisal of transistors; advantages and limitations of magnetic amplifiers; system reliability; cooling problems; sub-miniaturization; and new and improved components.

9716 Present Status of Transistor Development. J. A. Morton. *Bell System Technical Journal*, v. 31, May 1952, p. 411-442.

Discusses practical limitations of transistors and describes progress made in overcoming them and in extending their range of performance and usefulness in communications systems.

9717* Time-Resolved Spectroscopy of Spark Discharges. F. Tsui. *British Journal of Applied Physics*, v. 3, May 1952, p. 139-140.

Using a rotating-mirror and a spectrometer, the spectra of the light emission from spark discharges in several gases including A, He, Ne, and air were photographed at different instants after the current-initiation. Apparatus and circuit diagrams.

9718 How Transistors Work. *Chemical Engineering*, v. 59, May 1952, p. 370, 372-374, 376, 378.

Elementary explanation for chemical engineers. Diagram.

9719 Evaluation of Electrical Properties of Ferrite Materials For Specific Applications. Edward Emmerich and Sol C. Klaus, Jr. *Ceramic Age*, v. 59, May 1952, p. 26-29.

Discusses properties and production in general terms. Then considers use in television-sweep-circuit transformer cores; VHF transformer cores; antenna cores; permeability tuning cores; computer-circuit components; magnetostrictive components; induction-heating cores; and miscellaneous applications.

9720 What Can Transistors Do? Joseph A. O'Connor. *Chemical Engineering*, v. 59, May 1952, p. 154-156, 370.

Surveys the above from the practical viewpoint of their application to chemical-industry process controls.

9721* Characteristic Shifts in Oxide Cathode Tubes. W. P. Bartley and J. E. White. *Electrical Engineering*, v. 71, June 1952, p. 496-501. (A condensation. To be published in *AIEE Transactions*, v. 71, 1952.)

Presents an analysis and experimental results to clarify reasons for above shifts. Graphs.

9722* Physics of Some Loss Mechanisms in Gas Discharges. S. C. Brown. *Electrical Engineering*, v. 71, June 1952, p. 501-503.

Simplified analysis of the above.

9723* Gaseous Insulation For High-Voltage Transformer. G. Camilli, G. S. Gordon, and R. E. Plump. *Electrical Engineering*, v. 71, June 1952, p. 513. (A condensation. To be published in *AIEE Transactions*, v. 71, 1952.)

Discusses application, properties, toxicology, and advantages of SF_6 in reference to above.

9724* Performance Calculations on Electric Couplings. P. H. Trickey. *Electrical Engineering*, v. 71, June 1952, p. 529. (A condensation. To be published in *AIEE Transactions*, v. 71, 1952.)

Gives calculation sheet with an example of a small coupling. Graph.

9725* Dynamic Hysteresis Loop Measuring Equipment. H. W. Lord. *Electrical Engineering*, v. 71, June 1952, p. 518-521.

Describes test circuit in reference to above for magnetic materials. Discusses sources of error and means of compensating for them in the hysteresis loop displayed on the oscilloscope of the test unit. Block diagram and oscillograms.

9726* A Special Dynamometer For Testing Small Motors. S. H. Van Wambeck and W. A. Stein. *Electrical Engineering*, v. 71, June 1952, p. 549-551.

Design is based on the principle that output torque is equal and opposite to the reaction on the motor frame regardless of the source of external shaft loading. Graphs and photographs.

9727* What Price Accuracy in Instrument and Servo Motors? Nils B. Mickelson. *Electrical Manufacturing*, v. 49, June 1952, p. 106-111, 320, 322, 324.

A review to aid in the selection of presently-available instrument type motors and self-synchronous elements used in low-power systems. Tables and photographs.

9728* Wider Design Opportunities With the New Phenolics. Part I. The Molding Compounds. Alex E. Javitz, *Electrical Manufacturing*, v. 49, June 1952, p. 112-117, 342, 344, 346, 348, 350, 352, 354, 356, 358, 360, 362.

Describes new types of above, including rubber-phenolic blends, nylon-fabric-filled compounds, and experimental glass-filled compounds to accommodate demands for greater impact strength, dimensional stability under adverse atmospheric conditions, higher heat and flame resistance, better chemical resistance, and improved dielectric properties. Photographs and tables. 12 ref. (To be continued.)

9729* Magnetic Core Materials For Small Power Transformers. Arthur V. Hughes and Charles F. Salt. *Electrical Manufacturing*, v. 49, June 1952, p. 133-138, 324, 326, 328, 330, 332, 334, 336.

A study of various materials and configurations in relation to optimum transformer design. Effects of lamination thickness, joints, core clamps, temperatures, and frequency of operation on performance are also discussed. Tables and graphs.

9730* A New Form of Mica Insulation. H. A. Letteron. *Electrical Manufacturing*, v. 49, June 1952, p. 142-143, 336, 338, 340, 342.

An evaluation report on a paper-like, mica-tape insulation featuring high-temperature stability, high minimum dielectric strength, physical uniformity, dependability, and strength.

9731* Electronic Components in Continental Europe. *Electrical Manufacturing*, v. 49, June 1952, p. 290, 292, 294, 296, 298. (Based on talk by Carl B. Lindstrand.)

Surveys above, and discusses especially Se rectifiers and power resistors.

9732 Etched Sheets Serve As Microwave Components. R. M. Barrett. *Electronics*, v. 25, June 1952, p. 114-118.

Flat-strip transmission system operates successfully above 1000 mc. The metal-and-plastic sandwiches can be produced at low cost by printed-circuit etching techniques, replacing heavy and costly hybrid junctions and other waveguide components used in airborne radar and microwave-communication equipment. Illustrates system using Alclad sheets.

9733 Improvements Extend Magnetic-Amplifier Applications. Fred Benjamin. *Electronics*, v. 25, June 1952, p. 119-123.

Reviews the major component situation and shows its effect on current and potential applications. Diagrams and graphs.

9734 Operating Klystrons in F-M Microwave Links. Jona Cohn. *Electronics*, v. 25, June 1952, p. 124-127.

Klystron transmitters offer ease of adjustment and modulation, but suffer characteristic distortion when used with long transmission lines and mismatched terminations. Evaluation and correction methods for these effects are discussed.

9735 Vacuum-Tube Testers. James L. Flanagan. *Electronics*, v. 25, June 1952, p. 139-141.

According to a proposed classification by RTMA, there are 4 general types of testers currently being used to evaluate performance of tubes. Describes these devices and the meaning of their readings.

9736 Series-Peaking Network Design. Joseph F. Sodaro. *Electronics*, v. 25, June 1952, p. 148.

Nomograph permits rapid determination of series inductance and load resistance values for given cutoff frequency and shunt capacitance, and comparison of different circuit parameter combinations which give equal results.

9737 Pulse Delay-Line Design Chart. C. A. Epp. *Electronics*, v. 25, June 1952, p. 150.

Permits rapid determination of capacitance and inductance values for delay and pulse-forming lines having impedances of 10-10,000 ohms and for delays of 0.01-1000 microsec.

9738 Space-Charge Reactance Tube. Lavergne E. Williams. *Electronics*, v. 25, June 1952, p. 166, 170, 174-175, 178, 182.

Describes above tube, its theory and potential uses in many high-frequency applications where loading effects, reactive and resistive, of conventional reactance-tube circuits are objectionable. Diagrams and graphs.

9739 Germanium Power-Rectifier Construction. Fred J. Lingel. *Electronics*, v. 25, June 1952, p. 210, 212.

Describes construction and properties of Dot-Type Ge power rectifier known as the G-10A and developed by General Electric.

9740 Iron Atoms in the Service of the Electrical Engineer. Charles Goodeve. *Engineer*, v. 193, May 2, 1952, p. 599-600.

Extracts from Kelvin Lecture. Discusses properties, fundamental aspects, such as atomic and crystal structure, and their effects on mechanical and physical properties, including corrosion, creep, high-temperature behavior, and magnetic properties.

9741* Gas Blast Circuit Breakers; Recording of Current in A.C. Power Arcs Near Current Zero. F. O. Mason. *Engineer*, v. 193, May 23, 1952, p. 686-689.

Various methods of recording above currents are discussed and the particular method of recording current by amplifying the voltage drop across a low-value resistive element in series with the circuit in which current is to be measured is treated in some detail. Some preliminary results are presented. Diagrams and graphs.

9742* Simple Method of Independent Capacity Measurement. A. E. Fuerstenberg. *Engineers' Digest*, v. 13, May 1952, p. 153-154. (Translated and condensed from *Elektrichestvo*, no. 8, 1951, p. 72-74.)

Describes equipment for above, at line frequency. Equipment includes only one variable and two fixed resistances, the values of which must be precisely known, but no calibrated or variable condensers. Maximum error is about 0.3%. Circuit diagrams.

9743* The Oscillograph As A Null Indicator For A. C. Bridges. G. Tamburelli. *Engineers' Digest*, v. 13, May 1952, p. 155-156. (Translated and condensed from *Elettronica*, v. 1, Jan.-Feb., 1952, p. 29-33.)

Describes a method for balancing a bridge by means of only 2 operations and presents diagrams for practical applications.

9744* Measurement of Small Electric Arc Voltages and Currents. B. Novotny. *Engineers' Digest*, v. 13, Apr. 1952, p. 106-108. (Translated and condensed from *Elektrotechnicky Obzor*, v. 40, nos. 15-18, p. 304-310.)

Describes 2 devices, based on Se rectifier cells, for use in conjunction with conventional oscillographs. Gives design data. Graphs, oscillograms, schematic diagrams, and calibration curves.

9745* Experimental Testing of the Theory of Retarding-Field Oscillations. (In German.) Hans Georg Unger. *Frequenz*, v. 6, Apr. 1952, p. 89-98.

Describes and discusses measurement of the dynamic conduction of the grid anode section of a retarding-field tube. Results are compared with theoretical predictions. Diagrams and graphs.

9746* Static and Dynamic Processes in Relays. (In German.) K. Braun. *Frequenz*, v. 6, Apr. 1952, p. 99-104.

Mathematical analysis. Diagrams.

9747* Computing the Curvature of Rotating Condensers. (In German.) O. Schmid. *Frequenz*, v. 6, Apr. 1952, p. 105-107.

Demonstrates a generally valid formula for the computation of the radii of rotor condenser plates with "immersion" angles up to 180°C. Diagrams and graphs.

9748 A General Theory of Phase Transformation. J. E. Parton. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 4, Apr. 1952, p. 12-23.

The above by means of static pulsating-flux transformers is presented. Two 3-4 phase connections are worked out in detail, and the symmetrical phase-transformers used with mercury-arc supplies are discussed briefly.

9749 The Production of Very High Vacua By the Use of Getters. S. Wagener. *Proceedings of the Institution of Electrical Engineers*, v. 99, pt. 3, May 1952, p. 135-147.

Attempts to integrate all information which might lead to a fuller understanding of the physicochemical processes occurring on and in getter materials. Characteristics of getters are defined and correlations between them derived. Methods for measuring them are described and values for different getters and gases given. Two main mechanisms of the gettering process are distinguished: contact gettering and discharge gettering. Processes contributing to discharge gettering were investigated in detail, and an attempt was made to determine the parts played by adsorption, diffusion, and chemical reaction in different systems of getters and gases. Efficiency of flash getters is compared with that of coating getters, particularly thorium. Pressures attainable in tubes using flash and coating getters were measured, and influence of preparation factors investigated. 15 ref.

9750* The Plasmatron, A Continuously Controllable Gas-Discharge Development Tube. E. O. Johnson and W. M. Webster. *Proceedings of the I. R. E.*, v. 40, June 1952, p. 645-659.

Above tube utilizes an independently generated gas-discharge plasma as a conductor between a hot cathode and an anode. It appears to have considerable promise for uses which require the high-current and low-voltage operation that the high-impedance vacuum tube cannot supply. Numerous graphs.

9751* RF Phase Control in Pulsed Magnetrons. E. E. David, Jr. *Proceedings of the I. R. E.*, v. 40, June 1952, p. 669-685.

Describes the behavior of a magnetron oscillator started in the presence of an externally applied r.f. exciting signal whose frequency is not greatly different from the unperturbed steady-state frequency of the magnetron. Two points of view are presented: quasi-steady-state starting is assumed, and a differential equation representing the system within this limitation is de-

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rived. Second, the inhomogeneous Van der Pol equation is used to describe the system. Results of the two analyses are essentially in agreement.

9752* Space-Charge Waves in an Accelerated Electron Stream for Amplification of Microwave Signals. Ping King Tien and Lester M. Field. *Proceedings of the I. R. E.*, v. 40, June 1952, p. 688-695.

Space-charge waves in an accelerated or decelerated electron stream are studied. Results of solution obtained indicate that space-charge waves on a decelerated stream grow in amplitude, and can thus provide a method for amplifying microwave signals. Three amplifiers of this type were constructed and tested and the theoretical gain expression verified. Numerous graphs.

9753* Microwave Coupling by Large Apertures. Seymour B. Cohn. *Proceedings of the I. R. E.*, v. 40, June 1952, p. 696-699.

A frequency-correction factor is proposed for Bethe's small-aperture coupling relation for a transverse diaphragm in a waveguide. Experimental data indicated high accuracy of this factor up to and somewhat above the resonant frequency of each aperture.

9754* Axially Symmetric Electron Beam and Magnetic-Field Systems. Lawrence Arnold Harris. *Proceedings of the I. R. E.*, v. 40, June 1952, p. 700-708.

Dynamics of hollow or solid beams in axial magnetic fields are analyzed, assuming electrons do not cross each other radially. Design formulas are presented for 2 cathode arrangements: the first in a uniform magnetic field; the second inside a magnetically shielded structure. Limited experimental results confirm most of the theory presented.

9755* The Approximation With Rational Functions of Prescribed Magnitude and Phase Characteristics. John G. Linvill. *Proceedings of the I. R. E.*, v. 40, June 1952, p. 711-721.

A successive-approximations method is applied to the selection of network functions having desired magnitude and phase variation with frequency.

9756 The Initiation of Electrical Breakdown in Vacuum. Lawrence Cranberg. *Journal of Applied Physics*, v. 23, May 1952, p. 518-522.

Suggests the hypothesis that above phenomenon is due to traversal of the high-voltage gap by a clump of loosely adhering material. The implication for uniform-field gaps is that breakdown voltage is proportional to the square root of the gap length. A summary of literature and additional qualitative evidence is presented which tends to support this theory. 13 ref.

9757 Eddy-Currents in Solid Cylindrical Cores Having Non-Uniform Permeability. Harold Aspden. *Journal of Applied Physics*, v. 23, May 1952, p. 523-528.

Mathematical presentation of a method of estimating magnetization losses due to eddy-currents in solid cylindrical cores of ferromagnetic material. The concept of complex permeability is introduced to show the effects which hysteresis has upon degree of flux penetration.

9758 Arcing at Electrical Contacts on Closure. Part III. Development of an Arc. L. H. Germer and J. L. Smith. *Journal of Applied Physics*, v. 23, May 1952, p. 553-562.

Describes a system of experimental electrodes and an oscilloscope by which the potential across the electrodes can be recorded with a time resolution of about 10^{-9} sec. and a potential sensitivity of 1 trace width per volt. Diagrams, graphs, and numerous oscillograms.

9759 Instabilities in the Smooth-Anode Cylindrical Magnetron. Lawrence A. Harris. *Journal of Applied Physics* v. 23, May 1952, p. 562-567.

Mathematical analysis of a magnetically focused space-charge cloud of the type found in the smooth-anode magnetron, to determine whether a perturbation of the equilibrium condition will grow.

9760 The Effect of Velocity Distribution in a Modulated Electron Stream. Dean A. Watkins. *Journal of Applied Physics*, v. 23, May 1952, p. 568-573.

Describes method, based on the Liouville theorem, which considers the thermal velocity spread. 10 ref.

9761 Thermionic Emission and Electrical Conductivity of Oxide-Coated Cathodes. Shin-Ichiro Narita. *Journal of Applied Physics*, v. 23, May 1952, p. 599.

Above properties of "sintered" oxide-coated cathodes were measured by means of an imbedded probe and comparison made with those of ordinary oxide-coated cathodes. Activities were varied by evaporating barium from a batalum getter onto the surfaces.

9762 Lightning Protection Issue. *Journal of the Franklin Institute*, v. 253, May 1952, p. 375-504.

Contains following papers: "The Work of Benjamin Franklin on Thunderstorms and the Development of the Lightning Rod", B. F. J. Schonland; "Prejudice Against the Introduction of Lightning Rods", I. Bernard Cohen; "Lightning Protection Since Franklin's Day", K. B. McEachron; and "Experimental Lightning Research", Harald Norinder.

9763* Potentiometer Circuit for Measurement of High Potential. T. B. Rymer and K. H. R. Wright. *Journal of Scientific Instruments*, v. 29, May 1952, p. 139-141.

Measurement of d.c. potentials of the order of 50 kV. with an accuracy of 0.01%.

9764* Display of Transistor Characteristics on the Cathode-Ray Oscillograph. G. B. B. Chaplin. *Journal of Scientific Instruments*, v. 29, May 1952, p. 142-145.

Apparatus which displays simultaneously on a cathode-ray tube a family of n-type transistor characteristics, modifications necessary for p-type transistors being indicated. 11 ref.

9765 The Effects of Argon and Argon-Helium Mixtures on the Direct Current Arc. Bert L. Vallee and S. James Adelstein. *Journal of the Optical Society of America*, v. 42, May 1952, p. 295-299.

Use of argon as an environment for the d.c. arc results in marked prolongation of volatilization, increased initial electrode currents, and enhancement of lines of many elements, particularly volatile ones, when samples are burned to extinction and compared to He and A-He mixtures. An interdependent relationship between total time necessary for complete volatilization of samples, He and A composition of the atmosphere, and sample concentrations is demonstrated. A relationship between electrode current, percent He and A, and concentration of the sample also exists.

9766* A Decade Counter Valve For High Counting Rates. J. L. H. Jonker, A. J. W. M. van Overbeek, and P. H. de Beurs. *Philips Research Reports*, v. 7, Apr. 1952, p. 81-111.

Describes cathode-ray tube with a ribbon-shaped electron beam and one-dimensional deflection, in which the beam current is distributed over several electrodes of a special shape while, by means of a negative feedback from one of these electrodes to a deflection electrode, the beam can be fixed in each of 10 discrete positions. In each of these positions, a part of the beam impinges on a fluorescent part of the wall of the tube, so that the instantaneous position of the beam can be read in luminous figures. As these counter tubes can be connected in cascade, counting and calculating devices may be constructed with them.

9767* On the Scattering Matrix of Symmetrical Waveguide Junctions. A. E. Pannenborg. *Philips Research Reports*, v. 7, Apr. 1952, p. 131-157.

Description of the electromagnetic behaviour of microwave circuits with the aid of the scattering matrix is systematically developed. Special attention is paid to resonators. General considerations about consequences of structural symmetry of microwave circuits lead to an extensive discussion of junctions consisting of two parallel sections of rectangular waveguide having one of their sides in common. The theory for directional couplers obeying these symmetry requirements is derived. An attenuator and a standard matching transformer, both having a directional coupler as basic unit, are described in detail. (To be continued.)

9768* Power's Handbook on Transformers. J. J. O'Connor. *Power*, v. 96, June 1952, p. 71-86.

Mode of operation, available types, installation, operation, and maintenance are clarified by numerous diagrams and illustrations.

9769 The Dynamic Characteristics of a Low Pressure Discharge. B. T. Barnes. *Physical Review*, ser. 2, v. 86, May 1, 1952, p. 351-358.

Square-wave modulation of current at a frequency of 167-400 cps. was imposed on a d.c. discharge in a tube containing Hg vapor at a pressure of 6μ and argon at 3.5 mm. Intensity of λ2537 line and other data were recorded on oscillograms. 15 ref.

9770 On the Measurement of Current Density at the Cathode of a Glow Discharge and Aston's Law at Low Pressures and High Discharge Voltages. R. M. Chaudhri and M. A. Baqui. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 324-328.

Describes method for determining current density on a plane cathode of a glow discharge over a wide range of pressure and voltage.

9771 Observations on Radio-Frequency Oscillations in Low-Pressure Electrical Discharges. N. R. Labrum and E. K. Bigg. *Proceedings of the Physical Society*, v. 65, sec. B, May 1, 1952, p. 356-368.

Generation of high-frequency energy by electrical discharges in air at low pressures was investigated by observations with several types of discharge tube at frequencies near 200 Mc/s. and below 2 Mc/s. Random noise of high intensity was observed in both these frequency ranges. Coherent oscillations were also observed at the lower frequencies. Diagrams and graphs. 14 ref.

9772 Higher Current Metallic Rectifiers. Milton E. Gamble. *Product Engineering*, v. 23, June 1952, p. 119-122.

New designs for Mg-CuS rectifiers have boosted current limits to 200,000 amp. Even at such currents, regulation is good and overall size comparatively small. Diagrams, graphs, and illustrations.

9773 Increasing Tube Reliability in Industrial Circuits. D. G. Koch. *Product Engineering*, v. 23, June 1952, p. 175-181.

Describes methods developed to insure high reliability in specific industrial applications. Graphs and diagrams.

9774 The New G-10 Germanium Dot Rectifier. T. J. Ferguson. *Radio & Television News*, v. 47, June 1952, p. 42-43.

Engineering data on a new unit for radio, television, and allied power applications which uses no critically-short materials.

9775 An Improved Resonance Indicator. Irving Gottlieb. *Radio & Television News*, v. 47, June 1952, p. 44-45, 144.

Details on a unit which serves the purpose of a grid dip meter, but is entirely free from meter variation. It covers 3.1-31 mc. range.

9776* Industrial Applications of Semi-Conductors. Selenium. J. S. Blakemore. *Research*, v. 5, May 1952, p. 207-211.

Selenium has found important industrial applications by virtue of its rectifying and photoelectric properties. These and the bulk electrical properties are discussed and construction and theory of selenium rectifiers and photocells are described. Limitations of the theory are indicated. 22 ref.

9777 Tube Reliability From the Tube Manufacturer's Viewpoint. Marcus A. Acheson. *Sylvania Technologist*, v. 5, Apr. 1952, p. 34-35.

Some typical cases are examined showing how tube reliability is altered when new conditions are encountered not anticipated in the original design. Need for a cooperative effort having as its ultimate objective achievement of a properly balanced line of reliable military tubes is stressed.

9778 Shaping Nonlinear Resistor Characteristics. Jordan J. Baruch. *Tele-Tech*, v. 11, June 1952, p. 42-43, 88.

Graphical analysis of feedback circuit involved and applications for controlling characteristic curves of nonlinear resistors. Circuit diagrams.

9779 High Stability Computer Reference Power Supply. Frank R. Bradley and Rawley D. McCoy. *Tele-Tech*, v. 11, June 1952, p. 44-45.

Describes above, a series-regulated, full-wave rectifier with an electronic center-tap. Furnishes with precision, +100 or −100 v. at a combined capacity of 750 ma. Circuit diagrams.

9780 Ionophone For Audio and Ultrasonics. *Tele-Tech*, v. 11, June 1952, p. 49, 86, 88.

This transducer generates distortionless sound directly from modulated r.f. Has applications in A M receivers, sonar, and dielectric measurement. Circuit and schematic diagrams.

9781 Modified Magic Tee Phase Shifter For Microwaves. R. H. Reed. *Tele-Tech*, v. 11, June 1952, p. 50-52.

Alterations permit device described to shift phase independent of load while the distance between terminals remains constant. Shorting plungers of parallel symmetrical arms linked to a common drive and mutually opposed input and output facilitate measurement.

9782 New Low-Temperature Capacitors. J. W. Maxwell. *Tele-Tech*, v. 11, June 1952, p. 53, 138-139.

Describes above and gives electrical characteristics of electrolytic type suitable for operation to −55°C.

9783* Crystal Valves; Their Place in Electronic Developments. E. G. James. *Times Science Review*, Summer 1952, p. 14-15.

Surveys the above. Diagrams, graphs, and illustrations.

9784* New Xenon High-Pressure Arc Lamps. (In German.) K. Larché. *Zeitschrift des Vereines Deutscher Ingenieure*, v. 94, May 21, 1952, p. 453-455.

Above are shown to be similar to daylight, because of their continuous spectrum, and therefore especially suited for color photography, television studios, and theatres. The new lamps may be either air- or water-cooled. Photographs, tables, and graphs. 10 ref.

9785* Further Investigations on Evans Cells. (In German.) Kurt Wickert and Hartmut Wiehr. *Werkstoffe und Korrosion*, v. 3, Apr. 1952, p. 129-142.

Presents results of comprehensive investigation of the above (N_2/Fe/NaCl–Fe/O_2). Effects of mechanical and chemical surface preparation and other factors on cathode deterioration were studied. Numerous other relationships were also investigated. Graphs and tables.

9786 Resonant Circuit With Periodically-Varying Parameters. Part 2. Excitation of Oscillations by the Periodic Variation of Resistance. (Concluded.) *Wireless Engineer*, v. 29, May 1952, p. 120-126.

Mathematical analysis and experimental verification. Circuit diagrams and graphs.

9787 Linear Rectifiers and Limiters; Effect on Complex Signals and Noise. D. G. Tucker. *Wireless Engineer*, v. 29, May 1952, p. 128-137.

Mathematical analysis. 17 ref.

9788* Computations on the Electrode-Stabilized Arc Discharge. (In German.) Georg Schmitz. *Zeitschrift für Physik*, v. 132, no. 1, 1952, p. 23-29.

Diagrams and graphs illustrate mathematical discussion.

Miscellaneous Publications

9789 On the Mechanics of Magnetic Amplifier Operation. Robert A. Ramey. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1214-1222; disc., p. 1222-1223. (TK1 Am35tr)

Discussion is as nearly devoid of mathematical elegance as possible. Essentially an effort to "talk through" an analysis of magnetic-amplifier operation.

9790 Some Engineering Applications of the Electrolytic Field Analyzer. H. K. Farr and W. R. Wilson. *Transactions of the American Institute of Elecrical Engineers*, v. 70, pt. 2, 1951, p. 1301-1308; disc., p. 1308-1309. (TK1 Am35tr)

The electrolytic field analyzer or electrolytic tank is a device

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for measuring by analogy the physical quantities representing conditions in materials subjected to electric, magnetic, thermal, or other fields. Voltage and current are applied and measured around models consisting of conductors and insulators immersed in an electrolyte. Text and diagrams clarify typical examples in varied fields. Appendix gives mathematical theory. 10 ref.

9791 A Practical Application of Low-Frequency Magnetic Induction Theory. R. N. E. Haughton. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1310-1318. (TK1 Am35tr)

Deals entirely with abnormal low-frequency magnetic induction arising from power-system fault currents. Outlines essential concepts of the theory of abnormal low-frequency magnetic induction and describes their application to a practical field problem. 17 ref.

9792 Relative Performance of Normal Oils With and Without DBPC Inhibitor in Semisealed Transformers. E. D. Treanor and E. L. Raab. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1414-1420; disc., p. 1420-1421. (TK1 Am35tr)

Describes the above. Results are charted, tabulated, and illustrated. ("DBPC" is 2,6-di-tert.-butyl p-cresol.)

9793 The Application of Class-H Insulation to Transformers. Melvin L. Manning. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1427-1434; disc., p. 1434-1435. (TK1 Am35tr)

Reviews kinds of Class-H insulating materials recently developed, and evaluation of Class-H transformers. Class H insulation may consist of inorganic materials such as glass, porcelain, mica, or asbestos bonded or impregnated by silicone resins or rubbers or by the fluorocarbons. The difference, compared with Class-B insulation, lies in the resins and varnishes used as bonds and impregnants. 11 ref.

9794 Synthesis of Feedback Control Systems By Means of Pole and Zero Location of the Closed Loop Function. M. R. Aaron. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1439-1445; disc., p. 1445-1446. (TK1 Am35tr)

9795 Transient Conditions in a Transformer Supplying Energy to a Half-Wave Rectifier Circuit. P. N. Martin. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1468-1479. (TK1 Am35tr)

9796 Development of Corona Measurements and Their Relation to the Dielectric Strength of Capacitors. R. J. Hopkins, T. R. Walters, and M. E. Scoville. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1643-1651; disc., p. 1651. (TK1 Am35tr)

18 references.

9797 Magnetic Amplifiers of the Balance Detector Type —Their Basic Principles, Characteristics, and Applications. W. A. Geyger. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1707-1718; disc., p. 1718-1720. (TK1 Am35tr)

24 references.

9798 An Electromechanical A-C Line Voltage Stabilizer. D. M. Murray and N. L. Kusters. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1741-1748. (TK1 Am35tr)

Describes and diagrams stabilizer having a fast recovery time that compares favorably with some of the commercial stabilizers.

9799 An Electric Analogue Method For the Direct Determination of Power System Stability Swing Curves. W. B. Boast and J. D. Rector. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1833-1835; disc., p. 1835-1836. (TK1 Am35tr)

9800 The Magnetic Cross Valve. H. J. McCreary. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1868-1874; disc., p. 1874-1875. (TK1 Am35tr)

Discussion of a basically new electromagnetic device in which two stationary coils with no mutual inductance to each other in the ordinary definition of the term, transfer energy from one coil at one frequency to the other coil at a second frequency through the medium of a vector or field of flux which follows a lissajous locus or mode of motion. It is compared to rotary electromagnetic devices in which the more simple lissajous mode of motion or circle is used and to the transformer, which has but one degree of freedom. 10 ref.

9801 The Requirements and Design For a D-C Null Detector. Frederick L. Maltby. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1876-1881; disc., p. 1881-1883. (TK1 Am35tr)

In the apparatus described, a reversing synchronous contactor is used to invert the error signal into an alternating potential of the power frequency. This alternating potential is in turn amplified and impressed upon the control winding of a 2-phase motor which has its reference winding continuously energized at the power frequency.

9802 Transfer Function For a 2-Phase Induction Servo Motor. Lloyd O. Brown, Jr. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 1890-1893. (TK1 Am35tr)

Theoretical analysis and experimental confirmation.

9803 2-Phase A-C Servo Motor Operation For Varying Phase Angle of the Control Winding Applied Voltage. Mark A. Steinhacker and Wilbur E. Meserve. *Transactions of the American Institute of Electrical Engineers*, v. 1897-1993. (TK1 Am35tr)

9804 The 3-Phase Oscilloscope As An Harmonic Analyzer in Power Systems. E. B. Kurtz and R. H. Burkhardt. *Transaction of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 2056-2058; disc., p. 2058. (TK1 Am35tr)

Shows the significance of harmonic patterns produced on a polyphase oscilloscope. Explains how they arise, and relates the results to symmetrical systems. A series of patterns for various combinations of harmonics is presented.

9805 Bibliography of Magnetic Amplifier Devices and the Saturable Reactor Art. James G. Miles. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 2104-2123. (TK1 Am35tr)

Includes references on magnetic theory and measurements, core-material characteristics, and rectifier characteristics pertinent to development of magnetic amplifiers. Entries are arranged chronologically by year of publication, and alphabetically within each year by anthors' names. Also includes tabulation of significant patents, author index, and list of periodicals searched.

9806 On the Control of Magnetic Amplifiers. R. A. Ramey. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 2124-2128. (TK1 Am35tr)

Discusses theory of the above recently proposed by the author. Tells how to design an amplifier circuit for a specific problem. Illustrated experimentally by an electronically controlled magnetic amplifier.

9807 Steady-State and Transient Analysis of An Idealized Series-Connected Magnetic Amplifier. Louis A. Pipes. *Transactions of the American Institute of Electrical Engineers*, v. 70, pt. 2, 1951, p. 2129-2133; disc., p. 2133-2135. (TK1 Am35tr)

9808 Printed Circuit Techniques: An Adhesive Tape-Resistor System. B. L. Davis. National Bureau of Standards, Circular 530, Feb. 29, 1952, 81 pages. (T21 Un3c).

Describes carbon-resin, film-type resistor in tape form which is self-adhesive and suitable for use in printed circuitry. The range covered is 10 ohms to 10 megohms. Use of asbestos-paper tape and silicone-resin binder results in a resistor capable of operation up to 200°C. The tape is applicable at present only to glass or ceramic-base materials. Other electrical characteristics are similar to those of commercial carbon-resin, film-type resistors. Numerous graphs, diagrams, and illustrations.

Books

9809 Electric Circuits For Engineers. Edward K. Kraybill. 212 pages. 1951. Macmillan Co., New York. (TK3001 K86e)

A broad picture of steady-state electric circuit theory is presented by logical combination of a.c. and d.c. relationships into an integrated and unified whole. A working knowledge of ele-

mentary differential and integral calculus and physics is essential for adequate comprehension of the circuit theory presented. An attempt has been made to correlate electric phenomena with related phenomena in the general scientific field. Numerous diagrams, problems, etc.

9810 Antennas: Theory and Practice. Sergei A. Schelkunoff and Harald T. Friis. 639 pages. 1952. John Wiley & Sons, New York. (TK7872.A6 Sch26a)

Comprehensive treatment of antennas of various types in various frequency ranges. Said to be the only book combining a thorough discussion of antenna principles and theory of radiation with practical applications, it stresses physical ideas and pictures as well as methods of quantitative analysis. Chapter problems.

9811 Radar and Electronic Navigation. G. J. Sonnenberg. 272 pages. 1951. D. Van Nostrand Co., Inc., New York. (TK6575 So59r)

Deals with practical aspects of operation of the Decca, Loran, and Consol systems, Radar, and Echo Sounding. Emphasis is on those factors of operation and interpretation which are of practical use and importance to the navigator; sufficient theory is included for a clear understanding of basic principles. Photographs and diagrams explain principles clearly to the navigator, but also show him exactly what he may expect to see on the indicator of his apparatus.

See also:
8479 (feedback control systems for machine tools)
8675 (oxidation and reduction of Ni in alkaline storage batteries)
8693 (vaporization of wires by high-voltage discharge)
9125 (electricity as railway motive power)
9248 (deterioration of transformer oil)
9827 (printed electrical components for TV)

34. GRAPHIC ARTS

9812 Chromatographic Investigations Related to Photographic Theory. II. Adsorption of Developing Agents and Sodium Sulfite. T. H. James and W. Vanselow. *Journal of American Chemical Society*, v. 74, May 5, 1952, p. 2374-2376.

9813* Importance to Good Printing of pH Control in Lithography. Charles W. Latham. *American Printer*, v. 133, June 1952, p. 44-45, 58, 60, 62, 64, 66.

Extensive discussion of pH control of chemical solutions used in lithographic plant. Considers pH in relation to platemaking and plate handling; also two common methods of measuring pH: with colored indicators and with electrometric equipment.

9814* Present Status of Color Photography. (In German.) O. Wahl. *Angewandte Chemie*, v. 64, May 1952, p. 259-265.

Color photography, photographic multicolor-printing and technicolor processes are briefly discussed to exemplify the filter-separation process; the multilayer process; color development; fastness of colors, reproduction of color values; and chemistry of pigments in relation to photography. Diagrams and graphs. 19 ref.

9815* Bimetallic Plates and Electrolytic Etching. (In German.) Ernst Müller. *Fachhefte*, Apr. 1952, p. 94-98.

Discusses problems in the chemical and electrolytical etching of the above. Advantages and future prospects of electrolytic etching are evaluated.

9816 SRDS Direct-Image Process For Lithographic Printing. C. Laury Botthof. *Graphic Arts Monthly and the Printing Industry*, v. 24, May 1952, p. 80, 82, 84, 86.

Describes the above, a new method said to afford great savings in cost and time of producing lithographic press plates without sacrificing any advantages. A laminated structure of Al foil and cardboard is used. Sand blasting is used for graining.

9817* Contribution of Patra To Technical Progress. G. W. Soundy. *Managing Printer*, v. 37, June 1952, p. 22-23.

A list of some of the activities of the above printing research association.

9818* Dyed Film Emulsions Aid in Producing Stepped Multiple Positives and Negatives. Otis W. Muckenfuss. *Modern Lithography*, v. 20, May 1952, p. 37, 137.

Brief description of a procedure for treating commercial film, before it is used, so it can be handled and exposed under safe light conditions which allow ample illumination for ease in working.

9819* Is This the Plate? Henry R. Long. *National Lithographer*, v. 59, May 1952, p. 26-27.

Describes claims of William A. Frangos concerning a new printing plate coating, recently introduced under the trade name of "Metalife", and described as a non-colloidal, inorganic solution that contains a minimum of bichromate, depending upon the natural light-hardening properties of its ingredients for the greater part of its sensitivity. Upon coating, reaction with air is said to convert the solution into a collodial stencil, ready for exposure.

9820* Lithographing on Coated Paper. Part 3. (Concluded.) Robert F. Reed. *National Lithographer*, v. 59, May 1952, p. 28-31, 98-99.

Discusses the following defects and their remedies: picking, splitting and blistering; hickies and spots; scumming; tinting; solids that aren't solid; slurring; static electricity; and curling troubles. Also describes tests for various properties of coated paper.

9821* Basic Offset Press Operation. Frank E. England. *National Lithographer*, v. 59, May 1952, p. 32-33.

Sixth of series of articles.

9822* Some Recent Developments in the Theory of the Photographic Process. J. W. Mitchell. *Photographic Journal*, v. 92B, Mar.-Apr. 1952, p. 38-42.

A critical account of modifications to existing theories of formation of the latent image and of photographic sensitivity necessitated by recent experimental work. 24 ref.

9823* The Diazotype Printing Process; A Review. Louis van der Grinten. *Photographic Journal*, v. 92B, Mar.-Apr. 1952, p. 43-48.

Describes positive diazotype processes with particular reference to progress since 1945. Numerous patent citations. 18 ref.

9824* The Applications of Electronics in Photography. D. M. Neale. *Photographic Journal*, v. 92B, Mar.-Apr. 1952, p. 49-51.

Describes examples of above connected with: the photographic manufacturing industry; processing; photographic accessories; and color reproduction. 29 ref.

9825* Progress in Colour Correction by Masking Techniques. R. R. Robinson. *Photographic Journal*, v. 92B, Mar.-Apr. 1952, p. 52-59.

A review covering the last 10 yrs. Includes description of methods of providing correction for the secondary absorption shown by subtractive dyes. 92 ref.

9826* Direct-Image Offset Plate. A. G. Fegert. *Printing Equipment Engineer*, v. 82, June 1952, p. 80, 106-109.

Describes above, developed primarily for directory work. Al foil is laminated to moisture-proof tag stock.

9827 Printed Unit Assemblies For TV. W. H. Hannahs and N. Stein. *Tele-Tech*, v. 11, June 1952, p. 38-40, 112, 114, 116, 118, 120.

Describes above and gives performance data. Outlines etching and silk-screening techniques used in production. Photographs and tables.

9828* Color Development. III. The Behavior of Hydroxylamine-Containing Color Developers Towards Atmospheric Oxygen. IV. Effect of Copper Ions and Lime Preservatives on the Oxidation of Hydroxylamine-Containing Color Developers by Atmospheric Oxygen. (In German.) Kurt Meyer and Wolfgang Brune. *Zeitschrift für Wissenschaftliche Photographie, Photophysik und Photochemie*, v. 46, nos. 10-12, 1951, p. 169-178.

9829* The Role of Complex Silver Compounds in the Developing Process. (In Russian.) M. M. Ziuskin. *Zhurnal Prikladnoi Khimii*, v. 24, Nov. 1951, p. 1142-1150.

The reactions in photographic development were investigated. Data are tabulated, charted, and illustrated by photomicrographs.

35. STATISTICS AND ECONOMICS

9830* Iron Ore Supply: Present and Future. W. M. Goodwin. *Canadian Mining and Metallurgical Bulletin,* v. 45, May 1952, p. 267-270; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 177-180.

Surveys the above, especially for Canada.

9831* Western Coking Coal Resources. T. G. Ewart. *Canadian Mining and Metallurgical Bulletin,* v. 45, May 1952, p. 264-265; disc., p. 266; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 174-175; disc., p. 176.

Surveys the above, for both the U. S. and Canada.

9832* The Past, Present, and Future of the Canadian Steel Industry. J. Convey and S. L. Gertsman. *Canadian Mining and Metallurgical Bulletin,* v. 45, May 1952, p. 271-274; *Transactions of the Canadian Institute of Mining and Metallurgy,* v. 55, 1952, p. 181-184.

9833 The European Chemical Industry. Belgium. *Chemical and Engineering News,* v. 30, June 2, 1952, p. 2288-2293.

An economic survey. Tables and charts.

9834 Developments in Nickel. O. B. J. Fraser. *Industrial and Engineering Chemistry,* v. 44, May 1952, p. 950-954.

Discovery of Ni, developments in its technology and utilization, history of the metallurgy by which it has been won from its ores, are reviewed. Some physical data, statistical information to aid in defining the position of Ni in the world's affairs, and comments on the distribution of Ni minerals in the earth's crust and the locations of ore bodies, past and present, are also included. 11 ref.

9835 Iron Ore: Brazil Pecks Away at Vast Blue Lode. W. V. Packard. *Iron Age,* v. 169, May 15, 1952, p. 67-69.

Reports current status in the development of the Caué Peak hematite deposits in central Minas Gerais which run 69% Fe and hold up to 25% of world's ore reserves. Area now ships 1.5 million tons annually. Photographs.

9836 The Industry in the World Today. *Light Metals,* v. 15, May 1952, p. 157-159.

Emphasizes impact of government controls on U. S. aluminum industry. Tabular data.

9837 Economics of Natural Gas and Liquefied Petroleum Gases. B. R. Carney and B. J. Thompson. *Mechanical Engineering,* v. 74, June 1952, p. 467-472.

Discusses some results of growth of the industry and factors affecting further growth.

9838* Pressure on Producers Increases "Productivity" of Metal. *Metal Age,* May 1952, p. 4-8. (Based on paper by C. T. Saunders.)

Mr. Saunders set out to measure the growth of manufacturing industry and the change in its structure by measuring the consumption of 16 major raw materials in the United Kingdom from 1851-1950. The summary is limited to the 7 metals: finished steel, iron products, Cu, Zn, Pb, Al, and Sn. Tables.

9839* Three More Letters on the Dispute Over More Aluminum From Alcan. *Modern Metals,* v. 8, May 1952, p. 50, 52, 54-55.

Third installment of "an apparently unlimited series" dealing with the question of whether additional aluminum should be obtained from Aluminum Company of Canada or from further expansion of primary smelting capacity in this country. All of the disputants seem to agree that we should import more metal from Canada, but have different reasons. Letter from Dewey Anderson, defending his booklet "Aluminum for Defense and Prosperity" against the criticism of Sam Moment; a letter from Congressman Emanuel Celler addressed to Sam Anderson, head of DPA's aluminum division; plus another missive from Arnold Troy of Eastern Metal Products Co.

9840 Bituminous Coal. *Monthly Business Review* (Federal Reserve Bank of Cleveland), v. 34, May 1952, p. 1-5, 7.

An economic survey. Map and graphs.

9841 Outlook For Tin. Clyde Williams. *Monthly Business Review* (Federal Reserve Bank of Celevland), v. 34, May 1952, p. 8.

Discusses new research developments in utilization and in conservation of tin, the supply situation, and future prospects.

9842* Iscor's Importance in the Union's Economy. *South African Mining and Engineering Journal,* v. 63, Mar. 15, 1952, p. 73, 75, 77; Mar. 22, 1952, p. 117, 119, 133.

A survey of the above in reference to the state-sponsored organization, South African Iron and Steel Industrial Corp., Ltd.

9843* The Steel Industry of the World Under Great Stress. (In German.) Wilhelm Salewski. *Stahl und Eisen,* v. 72, Apr. 24, 1952, p. 453-459.

Economic analysis of expansion of the iron and steel industry throughout the world during the past 20 years. Graphs and tables.

9844* The Iron and Steel Industry of Upper Silesia. (In German.) Karl Tanzer. *Stahl und Eisen,* v. 72, May 8, 1952, p. 569-574.

History and present status.

9845* Pulp, Paper, and Paperboard in the United States; Review For 1951. W. Leroy Neubrech. *Tappi,* v. 35, May 1952, p. 8A, 10A, 12A, 14A, 16A, 18A, 20A, 22A, 24A, 26A, 28A-30A. (Reprinted from "Pulp, Paper, and Board Industry Report—Annual Review", v. 8, Mar. 1952, National Production Authority, U. S. Dept. of Commerce, Washington.)

An economic review. Tables and graphs.

9846* Iron Ore in the Sahara. *Times Review of Industry,* v. 6, May 1952, p. 88.

A group representing French, Canadian and British mining and metallurgical interests has recently formed a company to exploit rich and extensive iron-ore deposits on the western edge of the Sahara Desert. The ore lies in the vicinity of Fort Gouraud, in Mauritania.

Books

9847 Soviet Foreign Trade. Alexander Baykov. 100 pages. 1946. Princeton University Press, Princeton, N. J. (HC331 B14s)

Describes the system of foreign trade in effect in the USSR on the eve of the Second World War, analyzes the actual development of Soviet foreign trade in the past, and stresses facts which seem likely to influence that trade in the postwar period. Also describes the foreign trade of Tsarist Russia, and outlines the setting-up of the Soviet system. Deals not only with the main features, the machinery and the development of trade, but also gives a sense of the spirit of the system. Extensive tables and graphs.

9848 The Economic Problem of the Danubian States; A Study in Economic Nationalism. Frederick Hertz. 223 pages. 1947. Victor Gollancz, Ltd., London. (HC261 H44e).

Attempts to prove the "follies of economic nationalism". Gives a detailed account of the economic history of the 5 Danubian countries, Austria, Czechoslovakia, Hungary, Yugoslavia, and Rumania—during this century. Believes that World War II could have been avoided if these countries had not abandoned economic cooperation. This is said to have been a major cause of Hitler's rise to power. Contains a wealth of statistical information.

9849 The Potash Industry. Louis Hayner Kurrelmeyer. 83 pages. 1951. Division of Research, Department of Government, University of New Mexico, Albuquerque. (TN919 K96p)

An analysis of recent developments in the economics of the potash industry with particular reference to Carlsbad, New Mexico.

9850 The Future Population of Europe and the Soviet Union: Population Projections, 1940-1970. Frank W. Notestein, Irene B. Taeuber, Dudley Kirk, Ansley J. Coale, and Louise K. Kiser. 315 pages. 1944. League of Nations, Geneva, Switzerland. (HB851 N84f)

Presents results of extensive study of the above, prepared by Office of Population Research, Princeton Univ.

9851 Monopoly and Free Enterprise. George W. Stocking and Myron W. Watkins. 596 pages. 1951. Twentieth Century Fund, New York. (HD2731 St62m)

Describes the present structure of the American economy, with emphasis on relation of concentrations of economic power to the theory and practice of free enterprise. It shows how competitive forces have in specific instances been limited by American business concerns and, in certain fields, by legislation, and attempts to assess the economic and social effects of these developments. It then examines the attempts of government at controlling monopolistic practices. A final chapter presents report and recommendations for action of the Special Committee on Cartels and Monopoly appointed by the Fund to study the findings.

9852 Econometries. Gerhard Tintner. 370 pages. 1952. John Wiley & Sons, New York. (QA276 T49e)

A systematic treatment of modern statistical methods as applied to economic data. Stresses difficulties met in applying statistics in this field. Clarifies the problems with the help of numerous examples.

9853 Economic Survey of Europe in 1951. 243 pages. 1952. Research and Planning Division, Economic Commission for Europe, Geneva, Switzerland. (Dept. of Economic Affairs, United Nations.) (Also issued as *Economic Bulletin for Europe*, v. 3, no. 3.) (HC240 Un3.5e)

5th of a series of annual economic reports. Chapter headings are: Introduction: The General Economic Setting; Demand and Supply in European Industry and Agriculture; International Trade and Payments; The Struggle to Contain Inflation; Economic Developments in the Soviet Union; and The European Coal Problem.

9854 The Clays and Shales of New York State. 349 pages. 1951. Department of Commerce, State of New York, Albany. (QE471 N48c)

An attempt has been made to instruct the lay reader on the origin and geology of clays; to explain their mineral and chemical compositions in terms of how they affect potential uses; and to show the significance of the tests which have been made on these materials. Chapter I is an introduction. Chapters II and III give background information. Methods of the survey are described in Chapter IV. Results of the geological field work and testing for ceramic properties are given in Chapters V and VI, respectively. Finally, Chapter VII discusses economic uses of the materials. Appendix gives details of location, composition, and properties of each sample.

See also:
8432 (economics of nodular cast iron)
9125 (economics of railway fuel and energy sources)
9226 (economics of benzene from petroleum)
9263 (petrochemical industry)

36. MISCELLANEOUS

9855* Influence of Pressure on the Ultimate Shear Stress of Clay Suspensions. (In Russian.) R. I. Shishchenko and A. M. Avanesova. *Doklady Akademii Nauk SSSR*, new ser., v. 83, Apr. 11, 1952, p. 721-723.

A study was made of the above in connection with oil-well drilling. Data are charted and discussed.

9856* Aluminium and Its Alloys. R. W. Berriman. *Australasian Engineer*, Mar. 7, 1952, p. 76-82.

Discusses trends in the metallurgy of Al wrought and cast products. Gives compositions of the principal wrought and casting alloys, showing their relationship to general alloy characteristics. Summarizes phase relationships of alloying elements, and some properties of high-strength alloys, clad products, high-temperature alloys, and casting alloys. Discusses thermal treatments. Graphs and tables. 20 ref.

9857* *Antibiotics and Chemotherapy.* Published monthly by Washington Institute of Medicine, 667 Madison Ave., New York 21, N. Y.

A journal of experimental and clinical studies on antibiotics, hormones, and chemotherapeutics. Contains original research contributions solicited from all parts of the world, plus a small abstracts section.

9858 New 17-7PH Stainless Working Techniques. Gil Close. *Aviation Age*, v. 17, May 1952, p. 49-53.

A precipitation-hardening alloy developed primarily for sheet, strip, plate, and wire applications. It is available also in angles, bars and forging billets. Usually supplied in the annealed condition with an ultimate tensile strength ranging from 115-150,000 psi., a tensile yield strength of 35-55,000 psi., and an elongation of 20-40%. Offers corrosion resistance superior to that of any of the standard Cr stainless steels along with higher mechanical properties than any of the Cr-Ni types.

9859 Tips For Engineers in Research. C. H. Winter, Jr. *Chemical Engineering*, v. 59, May 1952, p. 324, 326-329.

Discusses need for short-cut calculation and experimental procedures. Emphasizes importance of observing the economic facts of life of the research laboratory and of becoming as self-sufficient as possible in handling routine problems.

9860 Contribution of Research to the Metallurgy of Cast Iron. Ralph V. Riley. *Foundry Trade Journal*, v. 92, May 15, 1952, p. 517-522.

Reviews established principles of testing methods of investigating the properties of cast iron, and achievements in cast-iron research, including development of nodular cast iron. 11 ref.

9861* Solubility and Fractionation of Polyvinylpyrrolidone. B. Jirgensons. *Journal of Polymer Science*, v. 8, May 1952, p. 519-527.

Gives fractionation methods. Shows usefulness of precipitation titration with ammonium sulfate for characterizing fractions and estimating molecular weights of samples of PVP. Tables and graphs. 13 ref.

9862 Titanium and Its Alloys. John L. Everhart. *Materials & Methods*, v. 35, May 1952, p. 117-132.

Special section covers engineering properties; forming and machining characteristics; cleaning and finishing; heat treatment; present and future uses; and weldability. Tables, graphs, and illustrations.

9863 The Precious Metals. *Materials & Methods*, v. 35, May 1952, p. 133, 135.

Data sheets cover Au, Ag, Pt, Pd, Rh, Ru, Os, and Ir with respect to physical and mechanical properties, fabrication, corrosion resistance, available forms, and uses.

9864* Results of New Investigations in the Field of High-Melting Metallic Hard Materials: Carbides, Nitrides, Borides, and Silicides. (In German.) R. Kieffer and F. Benesovsky. *Metall*, v. 6, Apr. 1952, p. 171-176.

Describes methods of production, properties, systems, and technical applications of the above on the basis of the literature. Tables and graphs. 51 ref.

9865 B. T. H. Research in 1951. *Metallurgia*, v. 45, May 1952, p. 251-252.

Brief reference to some examples of metallurgical interest in above research laboratory. Covers: creep of high-temperature alloys; welding techniques for turbine-rotor forgings; bonded silicides; magnetic sheet steel; machining research; infrared radiation pyrometer; and infrared photoelectric relays.

9866 Abstracting Journals; A Comparative Survey. *Metals Review*, v. 25, May 1952, p. 6-7, 12-14. (Extracts from "The Technical Society as a Library Resource", by Marjorie R. Hyslop. Transactions of the 41st Annual Convention, Special Libraries Association, 1951, p. 106-119.)

Four metallurgical abstract services were carefully analyzed on the basis of 5 aspects: kind of abstract, whether informative or indicative; timeliness; selectivity; source material; and subject matter. The services analyzed are: ASM Review of Metal Literature; Metallurgical Abstracts (Institute of Metals); Abstracts of Current Literature (Iron and Steel Institute); and Chemical Abstracts. Results of this check indicated that no one of the 4 publications included all of the abstracts covered by the other 3, although A.S.M. Review appeared to be the most comprehensive.

9867* Annual Review—1952 Edition. *Mining Journal*, May 1952, 248 pages.

Contains a series of articles under each of the following head-

36. *Miscellaneous*

ings: Review of the Metals and Minerals; Mining and Metallurgical Developments During the Year; The World's Mining Fields in 1951; and Progress of the Mining Companies.

9868* *Osteuropa.* Published bimonthly by Deutsche Gesellschaft für Osteuropakunde, e. V., Stuttgart, Germany.

This Anti-Communist periodical publishes articles on the political, scientific, commercial, and religious developments, on relations between Russia and other countries, and on world-wide communistic movements; it also includes interesting anecdotes and a review of literature.

9869* Activities of the International Center for Development of Aluminum. (In French.) *Revue de l'Aluminium,* v. 29, Apr. 1952, p. 164-165.

Outlines work of the various committees and of proposed program. Representatives of Germany, France, Italy, and Switzerland are included.

9870* The Uses of Fission Products. Paul J. Lovewell. *Scientific American,* v. 186, June 1952, p. 19-21.

Reports some of the findings of a survey carried out recently by Stanford Research Institute for the AEC.

9871* Ruling Engines. Albert G. Ingalls. *Scientific American,* v. 186, June 1952, p. 45-50, 52, 54.

Describes the formidable problems involved in production of diffraction gratings, and of the "engines" themselves, which must be fantastically accurate in order to produce satisfactory gratings.

9872* European Cooperation In Applied Science. Alexander King. *Times Science Review,* Summer 1952, p. 12, 14.

Discusses the above, with emphasis on work of OEEC (Organization for European Economic Cooperation) in scientific and technical matters.

9873* Oil In Russia. Part 4. Leonid Smirnov. *World Oil,* v. 134, June 1952, p. 292, 294, 296.

Geological formations, presently developed and potential sources. Maps.

Books

9874 Science in Progress. Ser. 7. George A. Baistell, editor. 505 pages. 1951. Yale University Press, New Haven, Conn. (Q171 S27sc)

As in the previous series, the manscripts are based on material prepared for the Sigma Xi National Lectureships and were first presented to local groups of the Society at leading educational centers. Lectures are as follows: "The First Heart Beats and the Beginning of Embryonic Circulation", Bradley M. Patten; "The Reproductive Cycle of the Rhesus Monkey", George W. Corner; "Human Infancy and the Embryology of Behavior", Arnold Gesell; "Radiation Damage to the Genetic Material", H. J. Muller; "Beyond the Gene—Two Years Later", T. M. Sonneborn; "The Macromolecular Structure of Biological Materials", Ralph W. G. Wyckoff; "The Elementary Particles of Physics", Carl D. Anderson; "Atomic and Solar Energy", Farrington Daniels; "Atomic Structure and Energy", J. R. Dunning; "The Theory of Braids", Emil Artin; "History of the Fauna of Latin America", George Gaylord Simpson; and "The Physical Chemistry of Polymers", Raymond M. Fuoss.

9875 V. E. Grum-Grzhimailo Cobranie Trudov. (V. E. Grum-Grzhimailo's Collected Works.) I. P. Bardin, editor. 246 pages. 1949. Academy of Sciences of the USSR, Section of Technical Sciences, Moscow and Leningrad. (TN705 B23v)

Collects writings of one of the founders of the metallurgical sciences in Russia. Published as a memorial on the occasion of the 12th anniversary of his death.

9876 Cracks in the Kremlin Wall. Edward Crankshaw. 279 pages. 1951. Viking Press, New York. (HX632 C85c)

Attempts to explain the Russian mind to Western readers, to show why they and especially their leaders behave as they do, and to predict what they may do under possible future circumstances. Discusses the military and economic potentials of the Soviet Union. Believes that, in contradiction to Burnham and Koestler, that our real fight should be with the present rulers of the Kremlin, rather than with Communism as an idea. Urges that we avoid adopting totalitarian methods in an attempt to defeat Communism, thus unwittingly allowing Stalin to win without war.

9877 Negotiating With the Russians. Raymond Dennett and Joseph E. Johnson, editors. 310 pages. 1951. World Peace Foundation, Boston, Mass. (HC331 D41n).

Nine persons with actual experience in above difficult process provide a factual, for the most part unemotional, description of their experiences in connection with specific assignments since 1943. A final chapter discusses Soviet techniques of negotiation in general terms.

9878 A Century of Science, 1851-1951. Herbert Dingle, editor. 338 pages. 1951. Hutchinson's Scientific and Technical Publications, London and New York. Q125 D61c)

The general plan of each chapter is to summarize the state of affairs in 1851 and in 1951 with an indication of outstanding events and personalities responsible for the century's progress. Articles are as follows: "The Concept of Energy", W. Wilson; "Field Physics", J. L. Synge; "Particle Physics", H. T. Flint; "The Structure of the Atom", W. Wilson; "The Structure of Molecules", J. R. Partington; "The Chemical Elements", J. R. Partington; "Geology", W. T. Gordon; "The Earth's Atmosphere", P. A. Sheppard; "The Constitution and Evolution of Stars", W. H. McCrea; "The Structure of the Universe", Harold Spencer Jones; "Organic Evolution", E. B. Ford; "The Coming of Man", F. E. Zeuner; "The Progress of Homo Sapiens", F. E. Zeuner; "Genetics and Embryology", G. R. de Beer; "Physiology and Histology", K. J. Franklin; "Biochemistry", F. G. Young; "Medicine, Surgery and Their Scientific Development", E. Ashworth Underwood; "General Psychology", Cyril Burt; "Medical Psychology", Aubrey Lewis; and "The Significance of Science", H. Dingle.

9878a A Century of Technology; 1851-1951. Percy Dunsheath, editor. 346 pages. 1951. Hutchison's Scientific and Technical Publications, London. (T19 D92c)

General plan of each chapter is to summarize 100 yrs. of progress in a specific field, with an indication of outstanding events and personalities responsible for the progress.

9879 Towards An Understanding of the U.S.S.R.; A Study in Government, Politics, and Economic Planning. Rev. Ed. Michael T. Florinsky. 223 pages. 1951. Macmillan Co., New York. (HC331 F66t2).

Attempts to appraise the evolution of the Soviet State from 1917 to the end of 1950. The study deals with communist theory and structure, methods, and policies of the Soviet government. Describes its formal structure, but objective is to show how it works in practice rather than to present a detailed account of institutions which have little bearing on Soviet realities. Much space is devoted to the policies of the socialist State in running its planned economy and in managing industry, agriculture, and labor.

9880 The Near East and the Great Powers. Richard N. Frye, editor. 214 pages. 1951. Harvard University Press, Cambridge, Mass. (JX1428 F94n).

Consists of introduction by Ralph Bunche, plus two groups of articles under the heading: "The Great Powers" and "The Near East". The first group is subdivided into 7 papers on political and economic factors and 3 on cultural factors. The latter group is subdivided into 3 papers on "The Palestine Problem" and 3 on "The Arab World".

9881* Metall- und Legierungsregister. (Handbook of Metals and Alloys.) Walter Krauskopf. 144 pages. 1950. Carl Hanser Verlag, Munich, Germany. (TA459 K86m)

Lists in alphabetical order about 1800 old and new metals and alloys by terms and trade names. The metals are defined by composition and their uses, properties and/or producer's names are indicated.

9882 The Population of the Soviet Union: History and Prospects. Frank Lorimer. 289 pages. 1946. League of Nations, Geneva, Switzerland. (HC331 L89p)

A comprehensive treatise, showing trends in the past and in the present. Includes economic structure and its effects. Numerous tables, graphs, and maps. 512 ref.

9883 Grundlagen der Metallkunde in anschaulicher Darstellung. (Fundamentals of Metallurgy in Graphic Presentation.) Ed. 3. Georg Masing. 148 pages. 1951. Springer-Verlag, Berlin, Germany. (TA490 M37g3)

Presents the basic facts of metallurgy and their relationship to technology. It treats the following points: atomic structure of metals and alloys, formation of solid solutions, thermal treatments, plastic deformation, stresses, recrystallization, and chemical behavior of metals toward nonmetallic corroding agents. Many charts, diagrams, and tables.

9884 Principles of Geochemistry. Brian Mason. 276 pages. 1952. John Wiley & Sons, New York. (QE515 M38p)

Presents a logical account of the earth's pre-geological history, utilizing new data on the abundance of elements and isotopes in earth and universe. Geochemistry of igneous, sedimentary, and metamorphic rocks, origin and evolution of the ocean; role of organisms in the concentration and deposition of individual elements, and nature of the primeval atmosphere are discussed. Stresses need for more persistent efforts to interpret the data of geology in terms of the principles of physics and chemistry. Chapter bibliographies.

9885 Russia's Lomonosov. Boris N. Menshutkin. 208 pages. 1952. Princeton University Press, Princeton, N. J. (Translated from the Russian). (HC331 M52rtr).

Lomonosov was an 18th century Rssian scientist, who, like Leonardo da Vinci, is said to have scrutinized and fathomed all existing knowledge—history, rhetoric, mechanics, minerology, physics, chemistry, art, poetry, etc. The story of his life illuminates the history of the early development of Russian science.

9886 Book Publishing in Soviet Russia. Helen Lambert Shadick, translator. 30 pages. 1948. Public Affairs Press, Washington. (Z366 B64tr).

An official survey based upon the data of the All-Union Book Department. Extensive tabular data.

9887 The Planets; Their Origin and Development. Harold C. Urey. 245 pages. 1952. Yale University Press, New Haven, Conn. (QB361 Ur2p)

The author's newly developed theories on the earth, moon, and terrestrial planets are based on original ideas which break with many traditional concepts. Discusses chemical processes taking place in the formation of the planets, abundances of the elements within the planets, and the heat balance of the earth. Outlines the possible process by which our earth and the other planets were formed. Written on a rather technical level, with a considerable amount of mathematics and footnote references.

9888 A History of Russia. Ed. 3. George Vernadsky. 533 pages. 1951. Yale University Press, New Haven, Conn. (HC331 V59h).

This standard text, first published in 1929, was written by the Professor of Russian History at Yale. The first 13 chapters cover various periods up to the Revolution. Seven more chapters cover chronological periods through 1945. Includes classified bibliography and index.

9889 Neuere Wege in der Metallurgie der Lager- und Weissmetalle. (New Developments in the Metallurgy of the Bearing and Babbitt Metals.) Ed. 2. Friedrich Vogel. 146 pages. 1949. Verlag Wilhelm Knapp, Halle (Saale), Germany. (TN673 V86n2)

This monograph reviews most important patents and publications on above. It contains, graphs, diagrams, and tables, and numerous references.

9890 Die Metallwirtschaft der Schweiz und ihre Nebengebiete. (The Swiss Metal Industry and Its Subsidiary Branches.) 120 pages. 1951. Verlag für Wirtschaftsliteratur G.m.b.H., Zurich 55, Switzerland. (Directory Shelf.)

Contains a list and index of all firms of the above industry, arranged according to their specialized fields, such as iron and steel foundries, nonferrous metal foundries, commercial firms for various types of metal products, etc., and also a list of their professional organizations.

9891 Soviet Geography; A Bibliography. Part I. U.S.S.R. Geography by Subject. 342 pages. 1951. Library of Congress, Washington. (Z2491 Un3s)

Covers the broad field of geography, which is construed as the science describing the land, sea, air, and the distribution of plant and animal life, excluding man but not his industries. Aim is to facilitate research by suggesting a number of important sources, primarily in Russian, for obtaining information on various aspects of the geography of the U.S.S.R. Entries were selected from two types of material: those containing basic facts, data, or descriptions, and those devoted to theoretical aspects. The 2441 items are presented within a classification scheme. Titles of Russian articles, etc., are transliterated, rather than translated.

9892 Dangerous Chemicals Code. 1951 Ed. 348 pages. 1951. Parker and Co., Los Angeles. (TP149 L89d)

This book was compiled by the Bureau of Fire Prevention of the City of Los Angeles. It includes definitions, abbreviations, general requirements, specific regulations under 6 general types of hazardous materials, and laboratory regulations.

9893* Neuerscheinungen Der Deutschen Wissenschaftlichen Literatur, 1939-1945. (German Scientific Publications, 1939-1945.) Ed. 2. 199 pages. 1948. Universitäts Verlag, Bonn, Germany. (Z7401 B64n2)

A bibliography of 4436 selected textbooks and monographs on the abstract and natural sciences, medicine, technology, and agriculture.

See also:

8424 (production, properties and applications of light metals)
8425 (electrolytic Mn and its alloys)
8432 (properties of nodular cast iron)
8455 ("Chill Cast Tin Bronzes"—book)
9024 (selection of toolsteels and carbides)
9129 (Transactions of World Power Conference)
9437 (metabolism studies with tracer compounds)
9477 (ion exchange in biological and medical fields)
9645 (book on rose culture)
9740 (properties of iron and steel)
9848 (economic history of Danubian countries)
9851 ("Monopoly and Free Enterprise"—book)